

NINETEENTH ANNUAL MEETING

TRANSACTIONS OF THE

Western

Surgical and Gynecological

Association

Nineteenth Annual Meeting, held at
Omaha, Nebraska, December 20 & 21, 1909

MINNEAPOLIS:
PRESS OF THE JOURNAL-LANCET
1910

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WILLIAM V. JACOBSON
JACOBSON WILLIAM

OFFICERS AND EXECUTIVE COUNCIL, 1910

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CHAIRMAN COMMITTEE OF ARRANGEMENTS

MALCOLM L. HARRIS - - Chicago, Ill.

EX-PRESIDENTS AND MEETING PLACES

PRESIDENT	PLACE	YEAR
S. S. TODD*.....	Topeka	1891
MILO B. WARD*.....	Kansas City.....	1892
MILO B. WARD*.....	Des Moines.....	1893
LEWIS SCHOOLER.....	Omaha	1894
JOHN E. SUMMERS, JR....	Kansas City.....	1895
THOMAS J. BEATTIE.....	Topeka	1896
JOSEPH EASTMAN*.....	Denver	1897
DAVID S. FAIRCHILD.....	Omaha	1898
HOMER C. CROWELL.....	Des Moines.....	1899
O. BEVERLEY CAMPBELL...	Minneapolis	1900
AUGUST F. JONAS.....	Chicago	1901
JAMES E. MOORE.....	St. Joseph	1902
ALEX. HUGH FERGUSON..	Denver	1903
CHARLES H. MAYO.....	Milwaukee	1904
HARRY D. NILES*.....	Kansas City.....	1905
MALCOM L. HARRIS.....	Salt Lake City.....	1906
CHARLES W. OVIATT.....	St. Louis	1907
WILLIAM W. GRANT.....	Minneapolis	1908
ARTHUR L. WRIGHT.....	Omaha	1909

*Deceased.

The Western Surgical and Gynecological Association does not hold itself responsible for, or necessarily endorse, any of the papers printed herein.

ARTHUR T. MANN, Secretary-Treas.

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Executive Session

DECEMBER 20, 1909—FIRST DAY—MORNING SESSION

The Association met at the Rome Hotel, Omaha, Nebraska, and was called to order at 9:30 A. M. by the Chairman of the Committee of Arrangements, Dr. John P. Lord, who said:

Fellows of the Western Surgical and Gynecological Association: It gives me great pleasure in behalf of the local members to welcome you to our city and to a meeting which we hope will be second to no other we have enjoyed. We regret that unfavorable weather and circumstances have kept so many of our fellows away from this opening session, but it has been thought best to call the meeting to order and begin with the program, so as to enable us to complete our work.

It gives me very great pleasure to present to you now your President, Dr. A. L. Wright, of Carroll, Iowa. (Applause.)

President Wright said: Owing to the long program it is unnecessary for me to make any introductory remarks, so that we may proceed at once to the reading of papers.

Dr. Thomas C. Witherspoon, of Butte, Montana, read a paper entitled "Some Interesting Cases in Bowel Surgery," which was discussed by Drs. Freeman, Collins, Mayo, Perkins, Wallace, and the discussion closed by the essayist.

Dr. L. W. Littig, of Iowa City, Iowa, followed with a paper entitled "Abdominal Contusions, with Report of a Case." This paper was discussed by Dr. Oviatt.

Dr. Chas. W. Oviatt, of Oshkosh, Wisconsin, read a paper entitled "A Unique Case of Foreign Body in the Intestine."

Dr. James F. Percy, of Galesburg, Illinois, read a paper entitled "Secondary (posterior) Gastrojejunostomy Following Recurrent Ulcer at the Site of Anterior Gastrojejunostomy Performed Eight Years Previously, together with a Statement as to the Cause of Gastric Ulcer." The paper was discussed by Drs. McArthur, Mayo, and, in closing, by the essayist.

Dr. B. B. Davis, of Omaha, Nebraska, read a paper entitled "Acute Peritonitis from Perforative Lesions."

Dr. Arthur E. Hertzler, of Kansas City, Missouri, read a paper entitled "A Scientific Inquiry Into the Present Treatment of Peritonitis."

These two papers were discussed together by Drs. Coffey, Knott, Eisendrath, Wallace, and the discussion was closed by Drs. Davis and Hertzler.

Dr. John P. Lord, of Omaha, Nebraska, read a paper entitled "Further Observations on Enterostomy and Its Technic."

Dr. Arthur E. Benjamin, of Minneapolis, Minnesota, read a paper entitled "Some Observations Concerning Intestinal Sutures."

On motion, the Association adjourned until 2 P. M.

FIRST DAY—AFTERNOON SESSION

The Association reassembled at 2 P. M., and was called to order by the President.

Dr. James F. Percy, of Galesburg, Illinois, First Vice-President, took the chair and President Wright delivered his address. He selected for his subject

"The Past, Present, and Future of Our Association and its Influence on American Surgery."

Dr. Daniel N. Eisendrath, of Chicago, Illinois, read a paper entitled "The Surgical Treatment of Renal Calculi." This paper was discussed by Drs. Harris, Freeman, Stokes, Mayo, and in closing by Dr. Eisendrath.

Dr. M. L. Harris, of Chicago, read a paper entitled "Movable Liver and Accessory Lobes of Liver." This paper was discussed by Drs. Coffey, Moore, Wright and Jones.

Dr. Samuel C. Plummer, of Chicago, Illinois, read a paper entitled "Two Cases of Operative Removal of Cervical Ribs." This paper was discussed by Drs. Percy, McArthur, Sherman, and, in closing, by the essayist.

Dr. A. F. Jonas, of Omaha, Nebraska, read a paper entitled "Inguinal Hernia: What Constitutes Predisposition?"

Dr. William Hessert, of Chicago, Illinois, followed with a paper on "The Frequency of Congenital Sacs in Oblique Inguinal Hernia."

These two papers were discussed together by Drs. Eisendrath, Witherspoon, Mayo, McArthur, Freeman, and, in closing, by Dr. Jonas.

Dr. L. L. McArthur, of Chicago, Illinois, read a paper entitled "Some Anomalies of the Sigmoid." This paper was discussed by Dr. Benjamin and, in closing, by the essayist.

Dr. Harry M. Sherman, of San Francisco, California, read a paper entitled "Rhinoplasty with the Aid of a Finger and of Skin from the Chest." This paper was discussed by Drs. Mayo and Lord.

Dr. Edward S. Judd, of Rochester, Minnesota, read a paper entitled "The Preparation of Patients for Prostatectomy," and the same was discussed by Dr. James E. Moore.

Dr. Arnold Schwyzer, of St. Paul, Minnesota, read a paper entitled "Duodenal Obstruction with Uncontrollable Vomiting and Surgical Method of Treating It."

A paper by Dr. James W. Cokenower, of Des Moines, Iowa, entitled "Poliomyelitis, Cause and Best Treatment to Prevent Deformity," was read by title.

On motion, the Association adjourned until 9 A. M. Tuesday.

DECEMBER 21—SECOND DAY—MORNING SESSION

The Association met at 9:15 A. M., and was called to order by the President.

Dr. Archibald A. Kerr, of Salt Lake City, Utah, read a paper entitled "Lymphangioma, with Report of a Case of Macroglossia and a Case of Macrocheilia." This paper was discussed by Drs. Collins, Lord, Mann, Percy, and, in closing, by the essayist.

Dr. Major G. Seelig, of St. Louis, Missouri, read a paper entitled "Further Experimental Data on Vasomotor Relations of Shock." This paper was discussed by Drs. Coffey, Hertzler, and, in closing, by the essayist.

Dr. James E. Moore, of Minneapolis, Minnesota, read a paper entitled "Osteomyelitis, Acute and Chronic." This paper was discussed by Drs. Freeman, Sherman, Mann, Mayo, Lord, and, in closing, by the essayist.

Dr. William Jepson, of Sioux City, Iowa, read a paper entitled "Report of a Spinal Cord Tumor." This paper was discussed by Drs. Plummer, Freeman, Seelig, and, in closing, by Dr. Jepson.

Dr. David W. Basham, of Wichita, Kansas, read a paper entitled "Report of a Case of Extrauterine Pregnancy with Twins, Complicated with Ovarian Fibroid." This paper was discussed by Drs. Coffey,

Perkins, Christie, Schwyzer, and, in closing, by Dr. Basham.

Dr. Harry S. Crossen, of St. Louis, Missouri, read a paper entitled a "Deceptive Form of Appendicitis in Women." This paper was discussed by Drs. Hertzler and Davis, and, in closing, by the essayist.

Dr. Horace G. Wetherill, of Denver, Colorado, read a paper entitled "Abuse of Hypodermic Stimulation During and After Surgical Operation." This paper was discussed by Drs. Mayo, Freeman, Benjamin, and, in closing, by the essayist.

On motion of Dr. E. M. Sala, seconded by Dr. John P. Lord, the paper of Dr. Wetherill was ordered published in the Journal of the American Medical Association.

Dr. Howard Hill, of Kansas City, Missouri, exhibited specimens for Dr. J. N. Jackson, showing pericolic membrane.

On motion, the Association adjourned until 2:30 P. M.

SECOND DAY—AFTERNOON SESSION

The Association re-assembled at 2:30 P. M., and was called to order by the President.

Dr. Willard D. Haines, of Cincinnati, Ohio, read a paper entitled "The Surgical Treatment of Hyperthyroidism."

Dr. Chas. H. Mayo, of Rochester, Minnesota, read a paper on "Intrathoracic Goiter, with Report of Cases."

Dr. A. M. Pond, of Dubuque, Iowa, followed with a paper on "Our Present Knowledge of the Pathology of Goiter and Some of the Sequelæ of Its Removal."

These three papers were discussed together by Drs. Schwyzer, Haines, and Mayo.

At this juncture the Secretary presented the report of the Council, as follows:

REPORT OF THE EXECUTIVE COUNCIL

Omaha, Nebraska, December 20, 1909.

There were present at the meeting of the Executive Council Drs. Wright, Oviatt, Harris, and Mayo.

Drs. Moore and Percy were appointed to fill temporary vacancies on the committee.

The following were recommended as officers for the coming year:

President.....John P. Lord
First Vice-President.....Harry M. Sherman
Second Vice-President.....Lewis L. McArthur
Secretary-Treasurer.....Arthur T. Mann

Executive Council: Charles H. Mayo to succeed himself and James E. Moore to fill the remaining vacancy.

In accordance with the motion presented last year (by the Secretary) it is recommended that the name of the society be changed to read "The Western Surgical Association."

The following are recommended for membership:
Nathaniel Allison.....St. Louis
Wm. A. McCandless.....St. Louis
Carl E. Black.....Jacksonville
Walter CourtneyBrainerd
John L. Yates.....Milwaukee

This fills all vacancies which are now available.

It is recommended that volumes of our transactions, beginning with 1907, be sent to the John Crerar Library of Chicago.

The Treasurer's report was approved, and is as follows:

RECEIPTS

Balance in treasury December 30th.....	\$972.85
Rebate on banquet at Minneapolis.....	19.41
Fees and dues to December.....	807.48
Extra tickets to banquet at Omaha.....	75.00
Total	<hr/> \$1,874.74

DISBURSEMENTS

Paid for printing	\$31.75
Paid for electroplates.....	14.98
Paid Wm. Whitford for reporting Minne- apolis meeting	139.49
Paid for 250 volumes of Transactions, printing and mailing.....	603.76
Paid for postage, express, etc.....	17.50
Paid for honorarium to the Secretary.....	100.00
Paid for badges.....	20.20
Paid for banquet for 66 at Omaha.....	330.00
<hr/>	
Total	\$1,257.68
<hr/>	
Balance on hand December 21, 1909.....	\$617.06

Chicago is recommended as the next place of meeting, with Dr. M. L. Harris as chairman of the Committee of Arrangements.

The date recommended for the meeting is Monday and Tuesday of the week preceding Christmas of 1910.

The following resolutions are offered on the death of Dr. Harry D. Niles:

We feel that our past president, Dr. Harry D. Niles, was not only a surgeon of high ideals, of great skill, and of wide influence in the profession, but that he was a man of broad sympathies and lovable character, who endeared himself to all who knew him by his personal charm, and that he will be missed from our fellowship as greatly as he is missed from his personal circle at home. We wish a copy of these resolutions to be sent to his immediate family.

DR. HORACE G. WETHERILL: I think the members of this Association who knew Dr. Niles, appreciated his rather unusual qualities. He was, if I am not mistaken, an ex-President of this Association, and I should like to move in relation to his death that we take a rising vote as a mark of respect and regret to his memory.

The motion was seconded and carried unanimously.

THE PRESIDENT: Dr. Mann and myself requested that a brief biographical sketch of Dr. Niles be drawn up by Drs. Kerr and Baldwin, and we have such a report here. I think it would be well to have it published in our Transactions in its present form, or as the Publication Committee may see fit, and unless there is some objection I shall so order. No objection being offered, it was so ordered.

IN MEMORIAM

Dr. Harry Dorr Niles, son of Andrew Fletcher and Margaret Ann (Dorr) Niles, the latter a niece of Jonathan Dorr, one of the pioneer surgeons of New York state, was born April 14, 1856, in Pennsylvania, and died of hemorrhage of the brain in Salt Lake City, September 28, 1909, aged 53 years.

His father, at the age of 76, is still actively engaged in the practice of medicine in Pennsylvania. His brother, Dr. John Niles, is also practicing medicine in Carbondale, Pennsylvania. Another brother, Frank, is engaged in business in Kansas City.

After the usual routine school work, Dr. Niles entered the University of Pennsylvania in 1875, and graduated in medicine from the Ohio Medical College in 1880. In 1890 he located in Salt Lake City and subsequently became surgeon to the Holy Cross Hospital, where, before his death, he was president of the hospital staff (1907-1908).

He has been an assiduous worker, taking post-graduate work almost yearly, either in this country or abroad. He contributed papers to various medical journals and was among the foremost in persistently advocating and adopting rational surgical procedures in abdominal, pelvic, and gastric pathological conditions, being the author of several monographs treating on the technic, etc.

In 1903-1904 he was elected and served as President of the Rocky Mountain Inter-State Medical Society.

His election as President of the Western Surgical and Gynecological Association (1905) was a recognition of his estimable qualities as a man.

In 1907 he was elected President of the Utah State Medical Association, and served for one year. During this time he assisted in the organization of the three Councilor Medical Districts into which the State is divided. His persistent endeavors for the advancement of medical knowledge has also been recognized by his being elected to honorary membership in the state associations of Colorado and Idaho.

He married in 1880 Miss Anna M. Lietz of Scranton, Pa. Their children are Frank Lietz and Elizabeth Margaret, the latter being a 1908 graduate of Wellesley College.

Dr. Niles was a skillful operator, and excelled in pelvic and abdominal surgery. He was courteous in his manner, keen in his wit, exemplary in his habits and earnest in his work.

His funeral services were held in St. Marks, the Episcopal cathedral, which was crowded with friends, anxious to honor his memory, not only as a leader in medical and surgical work, but as one of the "best and truest of men."

Rev. M. A. Saunders, of Oakland, Cal., a lifelong friend, conducted the services, and at its conclusion said:

"It is said that some men are born great, some achieve greatness, and some have greatness thrust upon them. He whom we honor here to-day was born great—in that a great man is the sum total of all the force and mind accumulated by his ancestors. It may appear here and there in flashes down the ages behind him, but some time this greatness is all

summed up in one man and we have one like him who has left us. In this he was born great. Some achieve greatness. He did. With his natural ability he worked long years without ceasing, and achieved greatness that all who knew him freely acknowledge was his due. Greatness was not thrust upon him undeserved. His fellow men freely proclaimed his worth without envy. He was born great, he achieved greatness by his own efforts, and the world acknowledged his greatness."

He was buried in Mt. Olivet cemetery without ostentation, surrounded by men who honored him as a physician and surgeon and a man.

It was moved and seconded that the report of the Council be adopted as read. Carried.

DR. CLIFFORD U. COLLINS, of Peoria, Illinois, read a paper entitled "Scopolamine and Morphine as a Preliminary to General Anesthesia." This paper was discussed by Drs. Seelig and Coffey.

The program having been completed, the retiring President, Dr. Wright, said:

Permit me to congratulate you, gentlemen, on the success of this the nineteenth annual meeting of the Western Surgical and Gynecological Association, and to thank each and every one of you for the cordial and uniform courtesy shown me at every opportunity by the members. This honor you bestowed on me unsought and unexpected, and except in point of long service, was unmerited.

I became a member of this Association in Omaha in 1894, at its fourth annual meeting, and consequently have felt very felicitous during this entire meeting in making a dual mark along the path of my medical career. In looking about me I find but few faces that were present then. The attendance was small. There was ample space for all in a room fifteen feet

square. Some of the old and familiar faces have passed to the great beyond; others, I know not why, have chosen long since to let us alone and have stayed away, due, no doubt, in many instances, to the crumbling and infirmities of age. In your deliberations I have endeavored to act as seemed best to further the interests of the Association and with an impartiality that has always characterized my actions in all my relations to this Association. Now that I am about to retire from the discharge of these duties that have been gratifying to me, I take great pleasure in turning over this honor to my successor, Dr. Lord, and have no hesitancy in assuring him that the uniform courtesy which has been extended to me by the members will also be extended to him, and lighten his efforts, so that it will be a pleasant memory throughout the life of all.

I take great pleasure in introducing your President-elect, Dr. Lord. (Applause.)

DR. LORD, in accepting the presidency, said:

Mr. President and Fellows: I want to thank you most heartily for this, the highest, honor in your gift. When I consider you as men and then all of you collectively, the high place which you occupy and your still higher destiny as a society, I indeed feel that I have been unduly flattered. I have labored many years among you, however, and as credit sometimes comes to the plodder, so I claim that credit for my elevation to this position, and therefore I say to the younger men, "be not weary in well-doing;" that your reward will come if you labor long enough and are sufficiently faithful, and that with it will come the pleasure that comes to me to-day. I thank you. (Loud applause.)

DR. WILLIAM D. HAINES: I wish to move that a vote of thanks be extended to the local members of the profession and particularly to the Chairman of

the Committee of Arrangements, Dr. Lord, for the very genial manner in which we have been received as an association and the most hospitable way in which we have been entertained.

This motion was seconded by several and carried unanimously.

As there was no further business to come before the meeting, the Association, on motion, then adjourned to meet in Chicago, December 19 and 20, 1910.

President's Address

THE PAST, PRESENT, AND FUTURE OF THE
WESTERN SURGICAL AND GYNECO-
LOGICAL ASSOCIATION

ARTHUR L. WRIGHT, M. D.

CARROLL, IOWA

I am deeply indebted to you, gentlemen, for choosing me your standard-bearer for this meeting. To be the unexpected recipient of an election to the presidency of an association composed of the best surgical talent in the West, is an honor any surgeon may well be proud of. I thank you most sincerely for this expression of confidence, and I can truthfully say that no honor has come to me that has been so highly prized. If you will bear with me during the present meeting with the same indulgence as characterized you in the past toward those who have presided over your deliberations, I have no hesitancy in assuring you that we shall have a pleasant and profitable meeting.

I wish at this time to express my profound sorrow and regret at the personal loss we have sustained since we last met, in the death of our former president and co-laborer, Dr. H. D. Niles, of Salt Lake City. Those who were so fortunate as to have a personal acquaintance with this genial, big-hearted physician knew him only to love him. I earnestly hope suitable action will be taken by the members, expressive of the

loss we have sustained and ask the bereaved wife, son, and daughter to permit our tears to mingle with theirs in this hour of deep sorrow.

There is no provision in our By-laws requiring your president to address you on a scientific subject or present a résumé of the progress made in surgery and gynecology during the year just past.

Your program is well filled with topics of vast surgical interest and will provide you with ample scientific thought. I refrain, therefore, from taxing your energies by discussing any of the many surgical subjects which must come under the daily observation of the active surgeon, but will exercise the inalienable prerogative my predecessors have exercised, and will present a few thoughts retrospectively regarding our association.

It is clearly our duty not only to maintain the past history and high standard of our organization, but constantly to strive to place it on a higher plane. We stop a moment in passing the present, to determine if the stewardship entrusted to our care merits the confidence reposed, then perspective glance at the future, which depends on our action in the present. "The duties of tomorrow are never so imperative as those of to-day."

The conception of surgeons in the West in uniting and forming an association for the sole purpose of discussing questions of interest to them only, originated with Dr. Milo B. Ward, a specialist doing abdominal surgery in Topeka, Kansas. In response to his request ten or fifteen men met in Topeka in December, 1891, and organized what I believe they called the Western Obstetrical and Gynecological Association, and chose him president. There were no papers read. The meeting was purely formative with large pyrotechnics. The second meeting was also held in Topeka with a larger attendance and more interest

manifest. I believe it was at this time the organization was rechristened "The Western Surgical and Gynecological Association." Many papers were read, and much enthusiasm aroused. Dr. Ward was again chosen to succeed himself as president. The doctor served his country faithfully during the Spanish-American War as Brigade Surgeon at Chickamauga Park. It was while serving in this capacity that he contracted the disease that caused his death soon after his return home. The third meeting was held in Des Moines, Iowa. The attendance was about the same, but manifestly more interest was taken in the new association and its scientific work. Dr. Louis Schooler was chosen president, and the next place of meeting was Omaha.

I became identified with the Western Surgical and Gynecological Association at its fourth annual meeting held in this city in 1894. The credentials of an applicant for membership were not so carefully examined then as now. Had they been I fear some of us would not be with you today. There were many causes operating favorable to the inexperienced surgeon. The small number in attendance had a marked influence, manifested in a lax censorship and a desire on the part of the Council to increase the membership. The attendance on that meeting was very small: it did not number twenty out of a limited membership of one hundred. The needs of such an organization, judging by the attendance up to this time, did not appear on the face of it. Most of those in attendance were from the small towns and cities within a radius of one hundred miles of Omaha. Few, if any, confined themselves to the practice of surgery exclusively, but all were identified, more or less, with general practice, doing their own surgery and such as was referred to them by near-by colleagues. The conditions have been rapidly changing, though we believed then, as

now, that admission to membership was a recognition of merit, which should stimulate young men to look forward to that end as the desired goal of an honorable ambition. It had been very difficult to interest those outside of our pale until time and better scientific work attracted the attention of those not of us, but now we have a full membership of 150 of the best surgeons in the world, with a long waiting-list of equally good men knocking for admission. The standard of excellence maintained is of the highest type and strictly conforms to the requirements of the constitution, which provides that an applicant for membership shall be limiting his practice to surgery and gynecology, no other being eligible. "While we do not claim to have taken unto ourselves and monopolized all of the surgical talent in this western territory, we think we have a large part of it, and in the selection of our members we have carefully considered their social, moral, and intellectual characteristics, as well as their professional attainments. The best interests of surgery and the future welfare of this Association are constantly uppermost."

It seems most fortunate that Omaha should have been selected as the place for holding the nineteenth annual meeting of the Western Surgical and Gynecological Association. It was here given an inspiration, a new lease of life, which awakened an interest that has had a most beneficent influence in awakening the members to a full realization of their duties in the premises. There was some feeling manifest at the small attendance we had had up to this time, and the meager amount of scientific work done. The pessimistic contended that the doors of admission should be thrown wide open and admit all reputable physicians on the general proposition "that a medical association is a school of mutual instruction and improvement,—a court of supreme authority into which the great

questions in medicine and surgery should be brought for discussion and enlightenment." On the other hand, it was maintained by those who had been most active at the time of its birth and had fostered the association during its short life that "to throw the doors wide open and have an unlimited membership would defeat the primary object of the organization and cheapen the membership. Such an association would have no distinctive characteristics: it would in no wise be different from others already in existence."

I distinctly remember the feeling and deep emotion with which the founder of this Association, Dr. Ward, spoke on this point and the importance of surgeons in this western country uniting for the sole purpose of discussing questions and methods of interest to them only. He maintained that "to accomplish the purpose of its creation, it was necessary that its membership should be limited; that it should be representative in character, and though its conditions of admission were exacting, it should not be used for a selfish motive. The intention was not to exclude meritorious candidates, but to prove their qualifications" and place a high value on the accumulated results of those associated and working together along scientific lines for a definite purpose, the increase of surgical knowledge and technic, the alleviation of suffering, and the prolongation of human life. The meeting was a heart-to-heart talk for betterment all along the line in our chosen field of work. Dr. Ward insisted that, although our membership was then small it would soon include the leading men of the West, and that the influence of this Association on scientific surgery would be widespread. The prophetic words spoken at this time by one whose perspicuity could see far enough into the future to proclaim the need of the hour have been fulfilled earlier than the most sanguine could have hoped, and today we count as fellows many

of the brightest stars in the surgical firmament. This meeting in this city today is a suitable commemoration of the confidence established in the work of each other and the assurance that the Association occupies a high place in the surgical world.

At that time the members of the Western Surgical and Gynecological Association represented the surgery of the Missouri River Valley. They were all-round men who had served a long apprenticeship as general practitioners of medicine. This long training in the school of hard knocks had had a mollifying influence that especially equipped them with surgical judgment and an equipoise obtained in no other way. There is a nonchalance about the Westerner that typifies him in song, medicine, and poetry, that exerts an unconscious influence while silently plying his vocation. The sincerity and enthusiasm of this little band of hard workers began to show results and attracted many of the men doing things between the placid Ohio on the east and the Golden Gate on the west, until now our membership of 150 is full of earnest men working to relieve suffering and for the betterment of surgery. The stimulating influence of attendance on the annual meetings has been most beneficent on its members and has encouraged them to better work. The enthusiasm has been infectious and has caught many in its meshes. As I look about me today I see many of those of long ago, who have attained state, national, and world-wide reputation as surgeons,—men whom we all love, honor, and cherish for what they have done in the domain of surgery; whose locks have been whitened by the finger of time while blazing their way to fame through unsolved surgical propositions.

The purpose of the Association was, primarily, the betterment of the members surgically, and the demanding from the public the respect and confidence that their skill merited. This confidence in the abil-

ity of each other has done much to make it possible for the small-town surgeon to relieve serious emergencies with a minimum of suffering and loss of life. Formerly the idea prevailed that special skill existed only in the densely populated centers. This tradition is rapidly passing away, and the halo of our city confrere is found to be no brighter than that of the physician at home. May we not hope that, as the knowledge of surgery and the interest taken in its increase become more general, men may be found of independent means who are willing to contribute for the advancement of surgery and the alleviation of suffering, thereby rendering a service to the community much more valuable than the political, philosophic, or social work at which so many of them labor with much zeal and success.

Each and every man is better for having been a member of this Association. His influence has aided materially in removing the evidence of weakness and in placing the organization on so firm a basis. That this standard may be maintained we must not lose sight of the fact that the honest and conscientious surgeon is not born, but gains his knowledge, skill, and dexterity by persistent, painstaking labor and constant application to a science more sacred than life itself. The qualifications of surgeons differ, one from another, in many respects, depending on the education, environment, personal experience, and individuality. Why one surgeon is more skilled than another is not to be told: it lies in the man and is beyond our ken. It is an individual characteristic upon which we cannot place our finger that is the essential prerequisite for success in any line of work. I cannot refrain from mentioning the bad influence of the young specializing in surgery before their mental faculties have fully expanded. This injures the mind and warps the intellect of the student by depriving him of adequate medical

and literary training, so essential to the thoroughly equipped surgeon. He may acquire knowledge of, and a minute acquaintance with, his subject, but the effect of devoting much time and study to one subject in early life, dulls one's enthusiasm for it, and he begins his life's work with much of his early interest and keenness gone. Enthusiasm is the most essential prerequisite for success in any work. This inherent desire to excel is a God-given attribute that is only satisfied in its doing. He who has won in his sphere of usefulness has an insatiable love for work and an enthusiasm that knows no bounds. The fruition of these desires should be the ambition of every young surgeon.

The Western Surgical and Gynecological Association has responsibilities resting upon it of no mean order. Today the Association occupies an enviable position among the scientific bodies in America, which must not be allowed to crumble, or fall away. The excellent character of the members assures that; for they now represent the surgery of this vast western empire. They are, with singularly few exceptions, all working earnestly, as best they can, in search of truth and for the good of humanity. They have done good work and achieved enviable results. The western surgeon has done more for the prolongation of human life than any known influence. Keen states that "the net result of Sir Spencer Wells' first one thousand ovariectomies," an operation first successfully performed by a western surgeon, "has added 20,000 years to human life, and at a time when asepsis was unknown. Modern surgery has so far passed this result that every thousand similar operations today adds not less than 30,000 years to human life." It would be utterly futile for us to try to compute in years the prolongation of life to the credit of the members of the Western Surgical and Gynecological Association.

In turning the Association over to those who are to have its future welfare at heart, I have but a few words to say. In order that its present position may be maintained, the credentials of each new applicant for membership must be carefully examined and only those admitted who are known to be proficient in the science and art of surgery, through long service, wide experience, and close application to the principles underlying an almost exact science. Personal prejudice should never influence our choice of a member, as an injustice against the organization might be committed. An effort should be made each year to infuse new blood. This will add vigor, strength, and a new working element that will maintain the Association in its present position.

The transactions of the Western Surgical and Gynecological Association for the first six years of its existence were not published. Most of the men who participated in the formation of its early history are still living, and no doubt they would be glad to furnish such information as would enable the publishing committee to complete our history and records for this period. I would recommend that this be done while it is yet not too late. Today we have a place in the surgical world and should look to our laurels lest they trail in the dust.

INTERESTING POINTS IN GASTRO-INTES- TINAL SURGERY

THOMAS C. WITHERSPOON, M. D.

BUTTE, MONTANA

There are no portions of the human body which continue to interest the surgeon more than do the abdominal and pelvic cavities. I have selected the subject, "Gastro-intestinal Surgery", with the purpose of drawing from my own experiences and relating some observations which I believe to be of practical utility.

For the meeting of the Southern Surgical and Gynecological Association this month, I prepared a paper on the subject "Gastromesenteric Ileus Following Gastroenterostomy." Attention was directed to an occurrence which I believe sheds some light on the question of paralytic conditions observed in the stomach and bowels. I will relate the case in a very cursory manner.

A man, previously healthy except for gastric symptoms, wiry, and active, suffered from gastric ulcer of a chronic type. The ulcer was not situated in the pylorus, but to the left, and there was no obstruction to outflow from the stomach, nor was there dilation. Eight full days after the gastro-enterostomy the stomach acutely dilated until its lower curvature reached the pelvic cavity. A second operation, done because of the dilation, nine days after the first, proved that the duodenum was normal, the bowels were flat, gastrojejunal opening still patulous, and there was no

point of obstruction beyond the stomach which could be discovered. There was, also, no evidence of inflammation of the stomach, the intestinal wall, or the peritoneum. A gastrostomy was performed and the fluid in the stomach had to be removed by pumping it out, as the stomach was completely paralyzed. Let me also state that the original incision in the epigastric area was not healed after eight days. It opened without instrumentation, immediately upon snipping the stitches at the second operation. On the ninth day this man suffered considerable pain in the stomach area and behind to the left. Following the gastrostomy the pain ceased. The epigastric incision, through which both operations were done, was closed at the second operation by through-and-through silkworm-gut stitches, and healed without the slightest inflammatory reaction. Without entering further into the details of the case, let me say that the conclusions to which I came after observing this patient were—

First.—The acute dilation was the direct result of a paralysis of the stomach wall.

Second.—The lack of healing in the epigastric incision, following a careful closure at the time of the first operation and not associated with an evidence of infection, must be attributed to a trophic disturbance.

Third.—The stomach and epigastric abdominal wall are both innervated by the same spinal segment. It is a matter of logical deduction that the central apparatus was responsible for the disturbance in both the stomach and the wound.

Fourth.—Only some toxic agent could have become so rapidly operative after eight full days of a normal condition following the operation, and this agent must have produced its effects by acting upon the ganglionic nerve cells in the spinal segment.

Fifth.—This toxic agent most probably took its origin from an abnormal fermentation within the

bowel, and an altered protective action of the mucous membrane of the bowel, or of the liver, failed to render harmless some product absorbed from the bowel lumen.

I believe the majority of cases of gastro-enteric ileus take this origin from a like disturbance in the cord, and knowing how readily the gastro-enteric process may be disturbed by factors, both local and remote, it becomes an easy matter to conceive that a broken limb, an injury to the head, a severe nervous shock, as well as dietary indiscretion and direct surgical attacks upon organs located in the abdominal cavity, may be followed by stomach or intestinal paralysis.

This case brings to mind one which came under my care about nine or ten weeks ago. The patient, a man of middle age, had not suffered from any sickness of note for some while, and was in perfect health just prior to an attack of intestinal obstruction. While at work he suddenly experienced pain in the abdomen, sharp and lancinating. Shortly after the pain he began to vomit, and when his physician saw him a diagnosis of mechanical obstruction was made. The belly was very much bloated; in fact the walls were tense. There was marked soreness over the entire cavity. The pains were augmented in a rhythmic manner, and vomiting became incessant. He was given a dose of morphine and sent to the hospital.

Deciding that it was imperative to proceed surgically, the abdomen was explored. Upon making the incision, a large quantity of mildly turbid, straw-colored fluid escaped. The loops of intestine which presented in the wound were distended and red, showing marked vascular engorgement. The colon was found to be somewhat flat. Search was then made for the portion of the bowel proximal to the colon which was involved or constricted. This was found about the junction of the middle and distal third of the ileum.

The bowel, at this point, for about a foot was darker than the rest, the wall somewhat edematous, and two brownish spots were discovered which had the appearance of necrotic areas. A search was made for thrombus or embolus of a mesenteric vessel, but no evidence of either condition existed. Under the circumstances it was difficult to determine what was best to be done. The bowel immediately beyond this segment of involvement looked quite normal. Diligent examination of the hernial areas revealed no evidence of an existing opening in which such a portion of bowel might have been incarcerated for a time. There was no plastic material thrown out about the bowel, nor was there evidence of its having been mechanically injured.

Believing the wiser and simpler plan to be a pelvic drain, in order to get rid of the peritoneal fluid for at least some hours and thereby cause adhesions to form about any necrosing area in the bowel-wall, this was adopted. The patient made a nice recovery after passing through some hours of shock and stercoremia depression.

Analyzing this case I am led to believe that there was an inflammatory process in the wall because of some disturbances of a bacterial kind within its cavity. It was readily seen upon examining the involved segment of bowel that sufficient tumefaction existed to put the muscle-coats *hors de combat* and to produce potential obstruction. The entire bowel proximal to this portion was parietic and full of fluid and gas. Inhibition to peristalsis proximal to the point of active involvement, could possibly be explained upon a simple physiologic basis.

But to return to our other case: we observed that the abdominal wall showed a decided lack of normal healing due to trophic influence. A similar condition existed in this patient, for after twelve days without

suppuration the superficial wound opened to a moderate degree after removing the stitches. The incision in this operation split the right rectus below the umbilicus. The peritoneum apparently united quickly. The muscle fibres separated at the upper end of the wound from which a serobloody fluid in small amount escaped. The lower part of the superficial wound healed fairly well while the upper part separated. It would seem therefore that the disturbance in healing was central in character. The probability is the proximal bowel paralysis was also a result of this same central disturbance.

As I look over past cases of the kind, I recall a like partial union of the abdominal wall in several. These facts would strongly suggest a cordal lesion in these bowel paralysees, with segmental influence retarding union.

Last year I read a paper before this society on "Intestinal Obstruction." In it I related the case of a man suffering from an obstruction due to a right inguinal hernia which was partly strangulated. The bowel-wall showed a small spot which looked suspiciously gangrenous. Following a suggestion which I have seen made, I did not resect this portion of bowel but turned it in by whipping healthy peritoneum over it. Death resulted, and a post-mortem showed an extended gangrenous process involving several feet of bowel. This case having resulted fatally I determined thereafter to rely either upon peritoneal adhesions for protection or to resort to resection. In the case under consideration I believed that resection was not wise, owing to the uncertainty as to the actual extent of the lesion, and therefore I resorted to drain, in order to bring about a peritoneal contact and allow adhesional shut-off, if possible. The result was happy, the patient making a nice recovery.

Intestinal paralysis, even where no peritoneal infec-

tion occurs, is accompanied by marked intoxication, the result of absorption of toxic products out of the bowel. This phase of poisoning I believe is more vital, as a rule, than that of absorption of toxic bodies out of the peritoneal cavity itself even when infected. I have been convinced for a long time that the amount of disturbance resulting from the passage of toxic products from the peritoneum into the blood when due to the usual colon bacillus infection, is not as great as that resulting from absorption out of the bowel.

The liver is able to maintain the defense of the body much longer in one than in another, and this is why these patients will show varying degrees of intoxication, some manifesting severe intoxication earlier, some later.

This brings me to the question of the use of salt solution given continuously per rectum. Unquestionably the presence of a large amount of water is helpful in elimination, and I believe quite efficient in these cases of bowel as well as tissue infection. I have often questioned, however, the utility of the salt itself. In fact, I believe that water given per rectum without the salt is better than water containing the salt.

In the last two and a half years we have had forty-six recoveries in general peritonitis following perforation of the appendix and of stomach ulcer. In these cases a continuous proctoclysis was not practiced save in two of them. The method of administering the water was that of intermittent injections into the rectum, averaging about sixty to eighty ounces in twenty-four hours. Where the patient's condition allowed removal of the appendix, or closure of the ulcer, and the establishment of pelvic drainage they recovered. During this period we had five deaths where simple drainage of the pelvis was all that was done, due to the extreme condition in which the patient was brought

to us. I am sure that we all agree as to the value of introducing water per rectum and keeping the stomach empty, but I think too much stress has been laid upon the value of continuous proctoclysis, using physiologic salt solution. The Fowler position with pelvic drainage seem to be the life-saving factors in general peritonitis.

Only recently a man was brought to me from a neighboring town suffering from general peritonitis resulting from a gangrenous appendix. His pulse was extremely rapid and so feeble that it could not be counted at the wrist. The abdomen was tense and swollen; purple spots of venous congestion of the skin were well marked. This man could not possibly undergo any sort of an operation at the time. I therefore washed out the lower bowel with large quantities of warm water and immediately gave a quart of normal saline by hypodermoclysis to which adrenalin chloride was added. In two hours another quart was given, and in a short while thereafter, the quality of the pulse having materially bettered, the patient was placed upon the table. A criss-cross incision brought the appendix into view, which was simply tied off, its stump burned with carbolic acid and capped by a rubber drainage-tube. A suprapubic incision was made and a glass tube inserted. This was all accomplished in a few minutes. Again during the operation the patient's pulse could not be counted. He was put to bed, wrapped about with warm bottles, and in about twelve hours the rally commenced, and he made an uninterrupted recovery. I am convinced that the use of adrenalin and normal salt solution under the skin had much to do with allowing the operation and saving his life.

This case brings to mind the often-discussed and time-worn subject of how to treat the appendix stump. I have made two rules for myself in all appendectomies. In cases where I drain I never crush the base

of the appendix, but simply tie it about with a linen ligature, cut it off, and after burning the exposed mucous portion of the stump with phenol, cap it with a rubber tube, which is held snugly in place by the same ligature with which the stump is tied. With a series of several hundred such procedures I have not had a fecal fistula follow an operation. When the rubber tube is taken out the linen ligature which tied the tube about the stump comes away with the tube, and the sinus closes quickly. Where no drain is necessary I tie the appendix stump off and invaginate by the commonly accepted method.

As to the manner of draining the general peritoneal cavity: I spoke in a former paper of the necessity of placing such drain in the median line, just above the pubes. Bowel obstruction may follow when a drain is passed through the abdominal wall into the pelvic cavity in such a manner as to allow the drain to touch the lateral pelvic wall at any point. The movable bladder below and the movable intestine above prevent kinking and bowel fixation. I use the same location for drainage in all general infections of the peritoneum.

I wish to call attention to a condition which is usually mistaken for a bowel lesion. As this mistake is so commonly made, I shall stretch a point and consider it for a moment in a paper on "Bowel Surgery." The lesion is one due to a perforation of the Fallopian tube near the horn of the uterus. The ovum implantation being intercolumnar, perforates, as a rule, at about three to six weeks, therefore before a manual diagnosis is possible. When perforation occurs the symptoms are gastro-enteric,—diffuse pain, vomiting, bloating, rapid pulse with loss of volume. These cases have been sent to me usually for bowel obstruction or ptomaine poisoning. The last one of this kind which

came under my care, left the hospital about two weeks ago, having recovered from a hemorrhage, the result of a three or four weeks' pregnancy of the right Fallopian tube. The perforation was small and was revealed only by inspection. The patient was brought from Ogden, Utah, where a diagnosis had been made of ptomaine poisoning. She had dined heartily just prior to the attack, and the physician attributed it to something she had eaten. The history of former tubal trouble with more or less prolonged flowing irregularly coming on, led to the probable diagnosis, which proved to be correct.

I think there is no symptom, or set of symptoms, in these cases which can absolutely be relied upon, but where doubt exists exploration is indicated. In neighboring towns within the last six months there have been two deaths, both of which were recorded as bowel obstruction following ptomaine poisoning. I feel confident a post-mortem would have revealed the presence of ectopic pregnancy.

About a year ago one of my friends, a physician, had the privilege of making a post-mortem on a case of this character in which he discovered the cause of death was perforation of the tube with hemorrhage.

One last matter of importance in gastro-intestinal surgery to which I wish to direct attention—that of post-operative adhesions. I have had to do a number of secondary operations where the primary operations had been successful except for the ill effect of resulting adhesions. There seems to be a lack of appreciation of the real need of a most careful peritoneal closure in all peritoneal surgery.

As to the matter of suture materials: I use catgut to close raw surfaces in the peritoneum. A 00, or, in other words, the finest catgut, is sufficient. I rely entirely upon linen where bowel-wall approximation is

to be accomplished. It seems to matter little whether the needle enters the mucosa or not, where snugly approximated. Where catgut is used, however, I never let the needle pass deeper than the serosa.

DISCUSSION

DR. LEONARD FREEMAN (Denver, Col.): I do not think so interesting and well-written a paper as this should pass without discussion. Dr. Witherspoon has called our attention to dilatation of the stomach, which takes place without apparent mechanical cause and he attributes some of these cases to the action of bacteria upon the nervous system. That may be true, but I somewhat doubt the absence of a mechanical cause *in addition* to the supposed action of bacteria. We know there are certain individuals who have stomachs that are difficult to empty, the difficulty being due, perhaps, to the sagging of the large intestine. This pulls down the stomach and to a certain extent shuts off the pylorus. Such cases occur once in a while and account for many of the difficulties in the emptying of the stomach. I think if we were to carefully study these cases of dilatation of the stomach we should often find some such difficulty in emptying the stomach originally.

Some time ago I operated on a very simple pelvic case. The operation was followed by dilatation of the stomach clear down to the pelvis, resulting in the death of the patient. An autopsy showed, as in the case which the doctor reported in his paper, that there was not absolute obstruction of the pylorus. There was no obstruction of the intestines themselves, but a fresh omental adhesion had taken place at the site of the pelvic operation, which pulled down the large intestine, that, in turn, pulling upon the gastrocolic omentum and stomach, thus kinking off the pylorus.

I think a combination of these things,—a stomach which does not empty itself very readily in the first place, combined, possibly, with a toxemia, such as the doctor has mentioned,—would serve to explain these cases rather than to adopt the theory of nervous trouble entirely by itself.

The doctor, in his paper, also mentioned that he laid great stress upon the use of salt solution and adrenalin beneath the skin. I agree with him so far as salt is concerned, but do not agree with him so far as adrenalin is concerned. When adrenalin is used beneath the skin it contracts the vessels and delays absorption, instead of promoting it. If we wish

to have absorption take place rapidly in the circulation we should not use adrenalin. As the basis for local anesthesia at the present time we employ adrenalin in order to prevent rapid absorption of the anesthetic.

DR. CLIFFORD U. COLLINS (Peoria, Ill.): I have been very much interested in Dr. Witherspoon's reference to the separation of the abdominal incision. Madelung, some years ago, reported quite a number of cases of separation of the abdominal incision and came to the conclusion that the kind of suture material used for closure had nothing to do with the separation. Dr. Witherspoon has introduced a new factor in the separating of incisions.

Dr. Emil Ries, of Chicago, a few months ago, in the American Journal of Obstetrics, reported three cases of separation in which he claimed the separation began at the peritoneal layer, and gradually the separation took place until the skin was reached, and then there was a sudden separation of the skin, which was the last process in the separation. In the other layers the separation occurred several days before.

I would like to ask Dr. Witherspoon whether, in his first case mentioned, the peritoneal layer and muscle layers showed any granulating process to indicate that separation had occurred some days before.

The second case was rather unique in the fact that separation occurred in the skin first toward the muscle layer, although in most of the cases reported it occurred in the peritoneum and muscle first.

DR. CHARLES H. MAYO (Rochester, Minn.): There are one or two points which I would like to discuss which were brought up in the paper just read by Dr. Witherspoon, and the first is with reference to acute dilatation of the stomach. If I understood him rightly he recommended gastrostomy for this condition where the stomach is so greatly distended and flaccid that it extends clear to the pelvis, and that during the operation the stomach is found so flaccid and paralyzed that it will not empty itself through the gastro-enterostomy opening, and its contents have to be pumped out. In other words, this patient seemingly derived as much benefit from the use of the stomach-tube and pumping out the contents of the stomach as he did from the general exploration and gastrostomy.

I think a great many more cases of dilatation of the stomach occur than is generally believed, and I would recommend

the more frequent use of the stomach-tube. In most of our cases the stomach-tube is employed in the post-operative treatment of surgical cases when vomiting occurs or sick stomach is evident. The more one sees or uses the stomach-tube in cases that are not doing well, the more frequently he will find a partial paralysis or paresis, showing that there is very little effort on the part of the stomach to empty itself, and yet by using a stomach-tube one will get a half pailful of fluid, and pressure on the abdomen will show that the distension has a great deal to do with the anemia of the area of the blood-supply, which prevents healing. The possibility, therefore, of affording relief by the use of the stomach-tube in these cases, without secondary operation, should be emphasized a good deal more than it has been done in the past.

The second point is with reference to the danger of draining the pelvis with a long drain next to the parietal peritoneum, that is, the pelvic wall. In the past few years I have more frequently drained laterally than centrally, although the incision is made centrally. In operating in the pelvis for pus-tubes and infective pelvic conditions, if we would make an effort to close completely and primarily the operative wound, which is seldom the best one for drainage purposes, and make one or two stab-wounds, and insert a drain along the lateral wall of the pelvis down to the pelvic base, we should find our results just as satisfactory.

DR. I. B. PERKINS (Denver, Col.): We all know that it is usual for patients to have considerable nausea following anesthesia, and for several years I have practiced putting these patients in the high Fowler position, and I have found that in that position they have much less nausea and can take water very freely, and it passes readily into the intestines and causes much less dilatation distress than I formerly observed in these cases. I had occasion to experiment a little myself in that line. I took an anesthetic for an appendix operation and was afterward put in the Fowler position, and the nausea ceased at once. Whether the result was due to the psychic effect or whether it was due to the better drainage, I do not know, but I had no nausea after I was put in that high Fowler position.

Another point I wish to mention in regard to this paper is the use of adrenalin in connection with salt solution. For several years I have practiced, when giving salt solution under the skin, putting from twenty to thirty minims of adrenalin in the salt solution to be used. The suggestion was made to

me by Dr. Grant of Denver, who had used it this way for quite a while. The theory is that the adrenalin went slowly into the circulation along with the large amount of salt solution and thereby gave not only an immediate but continuous stimulating effect.

Recently I had a rather serious complication, and I question whether or not adrenalin had not something to do with it. I was called to see a woman who had been delivered in the hospital,—her first child,—and there was adherence of the placenta. The physician in attendance had pulled upon the cord and had an assistant press upon the fundus, and together they succeeded in turning the uterus inside out. When I was called the uterus was lying in the bed between the woman's limbs and the physician had removed the placenta, and the patient had bled almost to death. There was no pulsation at the wrist. I took her at once to the operating-room and returned the uterus to its normal position by squeezing and pressure. At the same time I had her given a pint and a half of salt solution under the skin, and in it was put thirty minims of adrenalin. The stand was put high, the pressure was considerable, and it went quickly into the tissues. The pressure was very great where the fluid went in. The salt solution did not absorb, and the entire area sloughed. I question very much if adrenalin in that position,—there being so little blood in the body, had not something to do with the sloughing.

DR. C. H. WALLACE (St. Joseph, Mo.): We all know that the most common cause of failure of union of abdominal incisions, or incisions anywhere, is sepsis, and whether this sepsis be from without or within makes no difference.

Another condition that I think that we frequently do not consider and one that plays a factor in abdominal wounds, is the general condition of the patient at the time of operation. The anemic type,—patients with primary anemia or anemia resulting from chronic nephritis or some other organic lesions,—are liable to have faulty union. I am very glad that Dr. Witherspoon has called our attention to the possible nervous origin in these cases. While this is a rational theory it is yet to be proven by clinical experience and observation.

In regard to the use of salt solution in certain post-operative conditions: There are three factors that enter into the management of these cases, namely, the Fowler position, the administration of salt, and the absence of purgatives. While the first two have been emphasized by the profession,

the third one, namely, the withholding of purgatives until the parietic bowel has regained its function, has not had the consideration it probably deserves. There has been a disposition on the part of the profession to attempt to force peristalsis by the administration of purgatives. The administration of purgatives before the paralytic condition incident to the sepsis has returned to normal, has the effect of producing reversed peristalsis by causing stimulation of the healthy portion of bowel and producing harm instead of good.

In my opinion purgatives are better withheld until the bowels show a disposition to move, which occurs with a subsidence of the pathological condition.

DR. WITHERSPOON (closing the discussion): There were one or two points mentioned in connection with the use of adrenalin to which I desire to refer. Ten to thirty minims added to any quantity of salt solution would scarcely show any marked constriction at the site of injection. We ordinarily use adrenalin in local anesthesia, where it is much more concentrated.

The use of adrenalin in patients who suffer from a tremendous loss of blood is different from its use in patients who have vascular dilatation from a toxic process.

The point mentioned by Dr. Mayo, of using lateral drains, brings to my mind several cases I had under observation whose lives were lost because of obstruction, which came on at the end of a week. There was adhesion to the lateral pelvic wall. Three other cases I have in mind. One, a young, strong fellow, a Swede, had general peritonitis. I instituted a gauze drain through the criscross incision, and after opening the second time on the ninth day we had adhesion of a portion of bowel to the pelvic fascia. The bowel was tightly bound at that point. On re-establishing the connection between the bowel, by taking a portion of the ileum below and the transverse colon above, he made a nice recovery.

In another case I reopened the abdomen the second week after the primary operation, and had an opportunity of seeing an adhesion between the bowel and lateral pelvic wall.

In the case of the stomach dilatation I spoke of there was no shock. There was no pyloric obstruction. When I reached his stomach I found a low-grade ulcer. I drained the stomach by the posterior short-loop method of gastro-enterostomy, feeling that under the circumstances it was the best thing to do. In the second operation the pylorus was

still open, and there was absolutely no dilatation of any part except the stomach.

As to pressure: Undoubtedly it has much to do with those ulcers of the lower back in a fellow who has a broken back. But what I wanted to bring to your mind was the fact that there was sufficient evidence in this case to point to a central lesion, a trophic disturbance of some kind. Pressure may have been instrumental in causing non-closure just as it is in causing ulcer in the patient with a broken back where trophic disturbance exists.

Again, nothing is better than washing out the stomach in these cases of dilation, but it is very distressing when you have to wash these people out every few hours. They do not like it. It is a tremendous strain on the abdominal wall. If you do a simple gastrostomy it affords complete drainage. It relieves vomiting immediately and holds the stomach up during the time the patient is recovering from the paralysis of the stomach.

ABDOMINAL CONTUSIONS, WITH SPECIAL REFERENCE TO THE INDICATIONS FOR EARLY OPERATION, WITH REPORT OF CASES

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Intestinal perforations produced by a blunt, more or less quickly moving, vulnerating body, are sufficiently uncommon to be of considerable interest, yet not sufficiently uncommon to warrant a detailed report of classic cases before a body of this kind.

The first case to which I wish to refer is that of a middle-aged, robust farmer who was kicked on the abdomen by a horse, the accident being quickly followed by severe pain, vomiting, and rigidity of the abdominal muscles. He was not seen by myself until the abdomen was very much distended, and until the symptoms of a general peritonitis were all too prominent. He was not operated on, and died a few hours after I saw him.

The second case, also that of a robust farmer, middle-aged, who at two o'clock in the afternoon enjoyed a repast of eighteen ears of sweet corn, and who, two hours later, was kicked on the abdomen by a horse. For a short time he did not consider himself severely injured, but the pain soon became excruciating and his cries for assistance most frantic. Shortly after the accident he vomited "two basinfuls" of corn. When

seen by myself, in a farm house, at one o'clock in the morning, nine hours after the accident, he was suffering considerable pain, with a slight elevation of temperature. His pulse was somewhat increased in frequency, but, above all, the muscles of the abdomen were very tense and rigid, and pain on pressure was severe. The abdomen was opened at once, and a perforation sufficiently large to admit the little finger was found opposite the attachment of the mesentery, and at about the jejuno-ileac junction. The mucous membrane of the intestine partially closed the opening. There was a very severe but localized peritonitis, with a fibrinopurulent exudate; coils of the intestine near the opening were feebly agglutinated, and a few grains of sweet corn were found. The opening in the intestine was closed, the abdominal wound closed with drainage, and the patient made an uneventful recovery.

A third case was that of a rugged farmer of twenty-five, who was caught between two seats in a street-car collision. Fifteen hours after the accident I left him in bed and quite comfortable. Five minutes later I was recalled and found him in great pain, the abdominal muscles very rigid and very painful to the touch. There was an area of dullness extending downward from the liver and into the right loin. Because of the pain, rigidity, and abnormal resonance, I considered an immediate laparotomy indicated, and would have opened the abdomen at once, had not the officers of the car company urged delay until the last possible moment. There was no operation, the area of dullness gradually grew less, and the man eventually recovered. I always regarded this as a case of hemorrhage, probably from the liver.

Another patient, kicked by a horse, complained of great pain in the right lower quadrant of the abdomen, with dullness and distension of the same area, but without abdominal rigidity beyond the area of the dull-

ness. Operation disclosed an immense extraperitoneal hemorrhage from a ruptured deep epigastric artery.

I refer to these cases simply to use them as a text and as an introduction to the most interesting question in connection with abdominal contusions, the indications for early operation.

Hertle tells us that fifty-two per cent of the patients recover when operated on within the first six hours, forty-six per cent when operated on during the second six hours, twenty-one per cent when operated on during the second twelve hours, and but seven per cent when operated on during the second twenty-four hours. But the importance of early operation does not need argument.

It goes without saying that a history of the accident, the shape of the vulnerating body, and the direction of the blow are of considerable value. Blows directed toward the spinal column are more apt to result in rupture of the intestine than blows which are slanting and which are directed away from the spinal column.

Of the general symptoms to attract attention, shock is important. It may be so severe as to cause death, or may be entirely absent, depending much upon the shape of the vulnerating body. It is well known that a broad impinging surface, even without injury to the abdominal viscera may produce very severe shock, while a vulnerating body with a circumscribed point of impact, producing rupture of the intestine, may be characterized by entire absence of shock. The degree of shock does not depend on the injury done to the abdominal viscera, may produce very severe shock, or pelvic viscus, but upon the insult offered to the vagus, to the splanchnic nerves, or to the solar plexus. It is the more circumscribed impinging body which produces rupture of the intestine; it is the broad impinging body which produces shock, and for this rea-

son the degree of shock is no measure or indication of the injury done to the abdominal organs.

The patient is usually pale, the face expressive of suffering and anxiety. At other times the facial expression may not suggest severe injury. It is said that the shape of the contusing body is responsible for the facial expression, and what was said with regard to shock also applies to the facial expression.

During the continuance of shock the pulse is usually infrequent and hard, and it may continue thus for a few hours, twelve or even twenty-four. Increased frequency of the pulse, even with the good quality, points to trouble. The respiration is usually shallow because of the trauma to the abdominal muscles; later because of the peritonitis. The temperature varies: it may be normal in parietal contusion with rupture of the intestine, or high with contusion and hemorrhage. During the continuance of shock, it may be below normal.

The shock, the facial expression, the character of the pulse, the respiration, and the temperature give us but very little positive information, although, in a general way, they point to a severe injury.

A local symptom of very great value is the presence of gas in the abdominal cavity, as evidenced by the absence of liver dullness. But it must be remembered that the liver may "lie on its edge," and that liver dullness may not be detected when little or no gas has escaped, or no gas may escape from the intestine, even when there is a complete transverse rupture. The escape of gas is most free in perforation of the stomach.

The importance of free gas in the abdominal cavity, as an indication of rupture of the intestine, led to the one-time practice of injecting gas into the bowel. It has been truthfully said that this practice facilitates the escape of the intestinal contents and that it is far more dangerous than a laparotomy.

Another symptom of much value is the presence of local dullness, which may be due to hemorrhage or to the escape of intestinal contents, urine, or bile. But even rupture of the intestine is not always associated with the escape of intestinal contents. It may be said that by the end of the first twelve hours, about two-thirds of the cases will present abnormal percussion resonance, and later a much larger percentage, and for obvious reasons.

Pain is a symptom but seldom absent, although it may not manifest itself for some little time. Men have continued at work for a little while, or have walked to a physician's office, before severe pain has been felt. The pain is usually very severe, and is due to the escape of the intestinal contents, or blood, into the peritoneal cavity. It is not the rupture which causes the pain, but the consequences of the rupture. Vomiting is of common occurrence, but not of much importance unless of increasing severity. Biliary vomiting is significant, but vomiting is absent in from one-fifth to one-fourth of the cases.

The history of the accident, with the above symptoms, might make a working diagnosis possible, but the most valuable aid to diagnosis is the board-like hardness of the abdominal wall, which is not confined to the immediate point of impact and which continues for an hour or more after the accident.

The importance of this symptom was first emphasized by Monty in 1879, but was forgotten until revived by Hartmann and Trendelenberg. For a time the symptom was erroneously regarded as pathognomonic of rupture of the intestine, but, as stated above, if it be not confined to the immediate point of impact and if continued for an hour or more after the accident, it may be regarded as a sufficient indication for immediate laparotomy. In the presence of shock and in the absence of pain, the absence of this abdominal rigidity

must not be regarded as a favorable symptom. Sometimes this board-like rigidity may be on one side of the abdomen only, or it may be present in the upper or lower portion of the abdomen, but unequal or partial rigidity is found at a certain time only, when paralysis of the intestine is beginning, and all portions of the abdominal wall do not relax at the same time. Hertle states that, early in his experience, he expected to find the perforation under the distended portion of the abdomen, but experience taught him that it is more apt to be under the contracted or rigid part. This board-like rigidity may be due to the escape of blood or peritoneal contents, or it may be due to the pain, a true muscular defense. Later, of course, it is evidence of peritonitis.

The diagnosis of intestinal perforation is not conclusively established by this board-like rigidity. Injury to the other abdominal organs may give rise to the same picture, but it indicates serious internal injury and calls for immediate surgical intervention.

After all, the most important question demanding an immediate answer, is "to operate or not to operate." Two-thirds of all intestinal perforations caused by blunt non-penetrating vulnerating bodies are due to kicks by horses or to "hoof blows," and it is in this class in which the other symptoms indicating a severe injury may be absent. An urgent call for surgical interference is the presence of local dullness, but this is not always an early symptom, and it would be a great error to wait for its appearance.

Trendelenberg tells us that board-like rigidity of the abdominal wall is an indication for laparotomy, unless there be blood in the urine, when it would indicate a lesion of the kidney. But a lesion of the kidney does not exclude rupture of the intestine, and in a case of this kind the point of impact and the direction of the blow would be of much assistance.

In a very recent article Hildebrandt states that it is not absolutely true that this muscle rigidity is an infallible indication of intestinal perforation, but he makes this statement simply, he says, for the sake of truth. "But," says Hildebrandt, "unless the surgeon be a man of the greatest experience, this abdominal rigidity is a sufficient and positive indication for laparotomy."

If there is a contusion of the abdomen and if the muscles are rigid, operate. It must not be forgotten that patients may be seemingly well for a number of hours, or even days, and that injury to the mesentery may result in gangrene of the intestine and in death.

It may be stated that, given an abdominal contusion followed by board-like rigidity of the abdominal muscles which does not quickly disappear, a laparotomy should be immediately performed. This symptom may be absent during shock, in the absence of pain, but its absence under these conditions must not be regarded as a favorable symptom.

There may be some cases in which necessity for immediate operation is not clear. In these cases, do not give opium. There will be other cases which do not seem severe and in which an operation does not seem indicated. In these cases, do not give opium.

BIBLIOGRAPHY

1. Rupture of Small Intestine, L. E. C. Norbury, London Lancet, Vol. 2, 1908.
2. Symptoms of and Indications in Abdominal Contusions, Dehally and Lagane. Presse Medicale, Vol. 17.
3. Isolierte Mesenterialabreissungen nach Bauchkontusionen, Kudlek. Deutsche Zeitschrift fur Chirurgie, Leipsic, Vol. 94.
4. Offene und subkutane Verletzungen der Bauchorganen, R. Lampe, Medizinische Klinik, Berlin, Vol. 4.
5. Ueber einen Fall von Ruptur der vorderen Bauchwand mit gleichzeitiger querer totaler Durchtrennung des Darmes, als Folge stumpfer, Gewalteinwirkung, Haagn. Deutsche Zeitschrift fur Chirurgie, Vol. 97.
6. Verletzungen der Leber, Milz, Niere, des Pankreas, Vol. 51. Darms. W. Noetzel, Beitrage zur Klinischen Chirurgie, Tubingen, Vol. 51.
7. Zur weiteren Kasuistik der Bauch-Kontusion Beidel, Muenchener medizinische Wochenschrift, Vol. 53.
8. Zur Diagnostik der schweren Bauchquetschungen; ihre Indikation zur Laparotomie. Schmidt. Deutsche Medizinische Wochenschrift, Vol. 32.

9. Ueber subkutane Darmverletzung und ihre Behandlung. Lillienfeld. Beiträge zur Klinischen Chirurgie, Vol. 45.
10. Ueber stumpfe Verletzungen des Darmes und des Mesenteriums. Hertle. Beiträge zur Klinischen Chirurgie, Vol. 53.
11. Duodenalverletzungen durch stumpfe Gewalt. Meerwein. Beiträge zur Klinischen Chirurgie. Tübingen, Vol. 53.
12. Bauchverletzungen durch stumpfe Gewalt. Berger. Archives für Klin. Chirurgie, Berlin, Vol. 83.
13. Kontusionsverletzungen des Bauches, Voeckler. Muenchener Med. Wochenschrift, Vol. 54.
14. Ausgedehnte Mesenterialabreissung. Autenrieth. Muenchener Med. Wochenschrift, Vol. 55.
17. Zur Pathologie und Klinik der Darmkontusionen. H. Bucholz. Mitteilungen a. d. Grenzgebieten der Med. Chir., Jena, Vol. 47.
18. Two cases of Ruptured Intestine. Mole. Bristol Medical Journal, Vol. 25.
19. Berstungsrupture des Darmes. Grassmann. Deutsche Zeitschrift für Chirurgie, Vol. 91.
20. On Rupture of the Intestine, Campell, Annals of Surgery, Vol. 42.
21. Rupture of the Intestine, Golden, Annals of Surgery, Vol. 44.
22. Abdominal Contusions, Bolton, Northwest Medicine, Vol. 3.
23. Rupture of the Intestines, Lund. Boston Medical and Surgical Journal, Vol. 153.
24. Management of Abdominal Contusions, Jepson, Western Surgical and Gynecological Transactions, 1906.
25. Abdominal Contusions, Middleton, Railway Surgeon, 1901.

DISCUSSION

DR. CHARLES W. OVIATT (Oshkosh, Wis.): I would like to cite a case that came under my observation quite recently. A board flew off from a circular saw and struck the man in the right iliac fossa. The physician who saw the case stated that no symptoms developed for forty-eight hours. Rigidity, however, was marked from the start. The patient refused operation and died. An autopsy was held, and it was found that the cecum was torn loose from its attachment with a hole in the bowel. No symptoms which would seem to call for immediate surgical intervention presented themselves for at least thirty-six hours; nevertheless, the case illustrates the importance of operating early on these cases when rigidity is marked.

A UNIQUE CASE OF FOREIGN BODY IN THE INTESTINE

CHARLES W. OVIATT, M. D.

OSHKOSH, WISCONSIN

The unique feature of this case lies in the fact that no history was given of swallowing the foreign body until after the operation for its removal.

Mr. A. P., aged 40, was admitted to St. Mary's Hospital, February 22, 1908, with symptoms pointing to chronic appendicitis. No history of fact was given, but tenderness was distinct in the region of McBurney's point, and a small palpable tumor was present. A few days later an operation was performed, and an ordinary rubber-tip lead-pencil, seven and one-half inches in length, was removed from the cecum. The appendix was normal.

After the operation the following history was elicited: Ten weeks prior the patient had swallowed a pencil during a fit of laughter, rubber tip foremost. He said he had some pain in the region of the stomach with nausea and vomiting for a few days. Following this there were no symptoms for four weeks, at which time he had another attack of pain, nausea, and vomiting.

Upon opening the abdomen it was evident that the trouble was due to a foreign body within the cecum. An opening three centimeters in length was made in the cecum and the pencil removed.

TRANSGASTRIC JEJUNAL FEEDING

AFTER GASTRO-ENTEROSTOMY COMBINED WITH GASTROSTOMY. TESTED IN A CASE OF ARTERIOMESENTERIC ILEUS

ARNOLD SCHWYZER, M. D.

ST. PAUL, MINNESOTA

The problem of feeding a patient suffering from a very vulnerable open gastric ulcer, has many a time been under discussion, and advice to resort, in a desperate case, to a jejunostomy had remained as the only help, though little satisfactory, first, because an external fistula of the small gut has the tendency to very troublesome leakage (a point which, however, can be avoided by a good technic) ; second, because dangerous adhesions and kinks in the bowel may be formed ; third, because a speedy emptying of the acid gastric juices, the most important element for the cure of the ulcer, is not influenced by it ; and, finally, because, on account of this latter, an operation must follow later on in most of these severe cases. It may be said, however, that when the food is taken by mouth in the normal way the gastric juice is by far more freely secreted than by any other ingestion. In extragastric feeding HCl is therefore to be expected only to a moderate amount in the stomach. Experience has taught that, in the long run, feeding by a gastrostomy fistula is mostly insufficient, and that the patient gradually slowly loses ground by it. It can thus be

concluded that by jejunal feeding the nutrition suffers much more, because the presence of chyme in the duodenum is of great importance for the secretion of the pancreas. A jejunal fistula can therefore be of great use only when we have to tide the patient over a starvation of a number of weeks, but there it does infinitely more than rectal feeding. I had concluded that in a case of severest gastric ulcer, where gastroenterostomy and, in addition, a jejunostomy seem desirable, a better result could be obtained by a modification of these operations for drainage and for extragastric feeding. This modification I had a chance to try in a case of duodenal obstruction with a most rebellious stomach. This patient does not really belong to the group of cases spoken of, but shows the possibility of usefulness of this procedure in different conditions. The case is, through a number of rarer occurrences, interesting enough in itself to be related in detail.

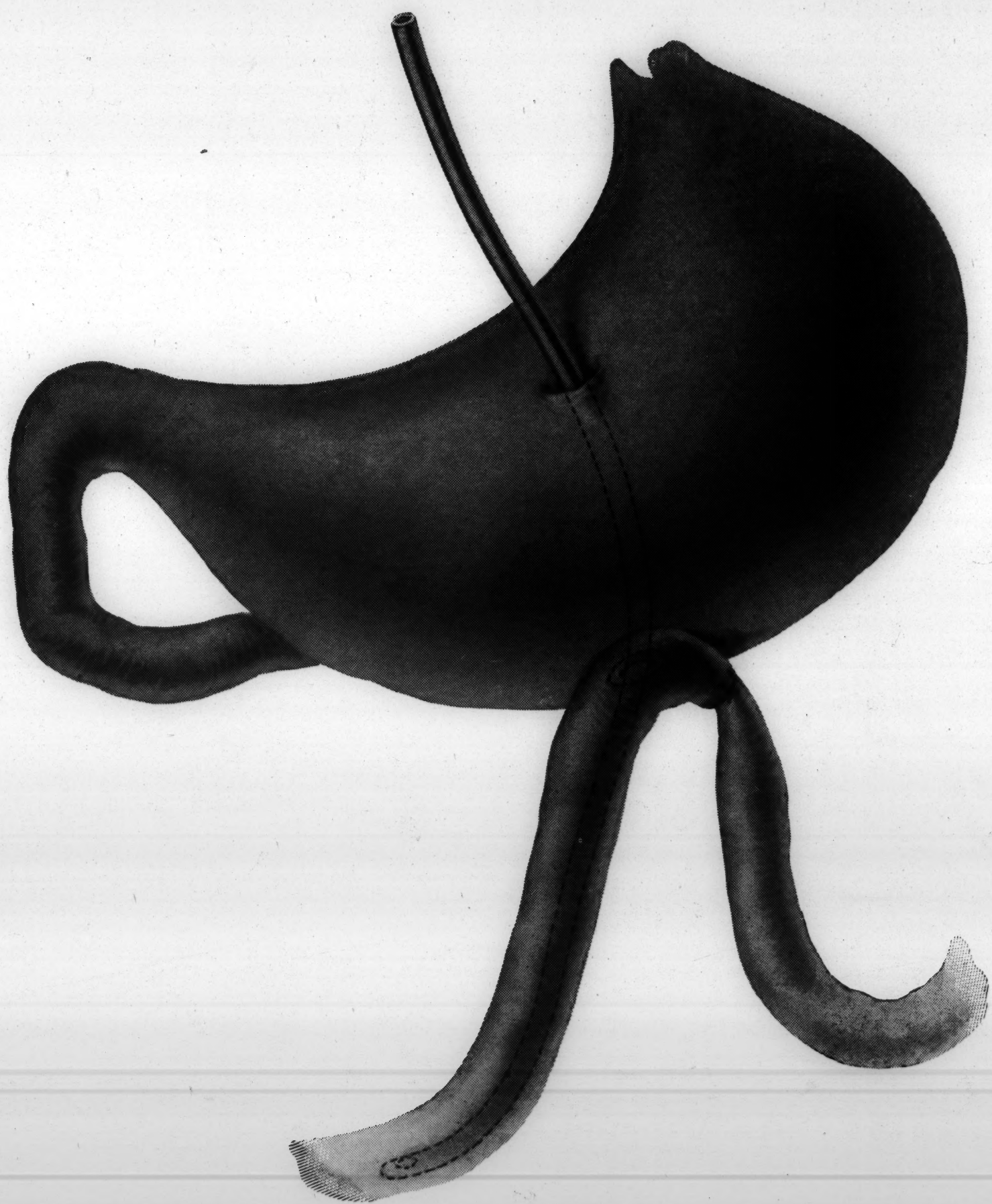
Sister S., aged 23 years, nurse in charge of one of the floors at St. Joseph's Hospital, who had been in splendid health up to the end of 1907, began to look thinner after that time. She was suffering from very little pain, but could not eat solid food, and during February and March, 1908, was living practically only on buttermilk and even had to gradually reduce the quantity of this latter.

I first saw her on April 6, 1908, and she remained under my observation until April 23d. During this time there was frequent vomiting, and at times the vomitus contained blood. Abstinence from food lessened the amount of vomiting, but did not produce complete cessation. The blandest ingesta in minutest amounts were vomited up very shortly after being taken. The pulse ranged from 50 to 80; temperature, from 98° to 99.6°. All suggestions of surgical interference were rejected until April 23d, when permission

to operate was granted. Preliminary to the ether narcosis, one-sixth grain of morphine with 1-150 gr. atropin, was given hypodermically. On opening the abdomen the stomach appeared slightly ballooned, and also the upper duodenum, the pyloric ring being wide. At the lower end of this dilated part of the duodenum a broad, very firm band of adhesion unites the duodenum with the gall-bladder. The tense gall-bladder is found to contain small stones. The gall-bladder was dissected free. The lower ducts were normal. A drain in the gall-bladder was let out through a stab-wound in the right border of the ribs. Air pressed through the lower duodenum by compressing the stomach seemed to pass. The experiment, however, is not beyond doubt. Exploration of the other parts of the abdomen revealed an adhesion of the omentum to the abdominal walls at a point a little below the level of the spleen. This adhesion was divided. The bulk of the omentum was fixed in the pelvis and could not be moved upward, as if broadly adherent. The abdominal walls were tightly stretched and pressed toward the vertebral column, the narcosis then not being complete. We were struck by the lack of space antero-posteriorly in the umbilical region. After forcible forward retraction of the abdominal walls the omentum was gradually drawn out of the pelvis. It was not adherent, but was very bulky. The transverse colon was long and large and had also been lying below the promontory. The small intestines were entirely collapsed and contracted. The condition suggested arterio-mesenteric ileus. The omentum was brought into contact with the wound, and one stitch caught it in the lower angle to hinder its returning to its former position. The abdomen was now closed. Right after the operation the respirations were 12; pulse, 88. Two hours afterward the respirations had slowed to 8 per minute, and soon afterwards to only 4 per min-

ute. The pulse became weak and irregular—122. The following day vomiting became continuous, and considerable blood was noticeable in the vomitus. The vomitus was composed of liver and pancreas secretions.

I determined now to combine a gastro-enterostomy with gastrostomy and pass a gastrostomy-tube through the opening in the anterior wall of the stomach and across the stomach through the gastro-enterostomy opening some distance into the jejunum. By the use of a rather large Murphy button a rubber catheter could be passed through its opening into the lower arm of the jejunal loop, and since this catheter would nearly, but not tightly, fill the lumen of the button the tendency would be to retain the infused food in the intestine, though some drainage was possible along the tube and through the side holes of the button for the gastric and other regurgitated secretions. In accordance with these purposes the wound was reopened. The omentum again seemed to be down into the pelvis. It was raised up, and with as little eventration as possible the first part of the jejunum was secured and an antero-inferior gastro-enterostomy was done, the smaller half of the button being inserted into the stomach. Then a good distance from the gastro-enterostomy opening a tiny opening was made into the stomach wall, just enough to make it possible to force a soft catheter through, which was, however, rigid enough, so as not to double up too easily, and thus not to have its jejunal end eventually expelled back into the stomach by the collection of a greater quantity of food in the gut. This catheter was brought out through the gastric half of the button, then inserted into the lower half, and now the button was closed. The catheter was pushed in far enough to reach about 10 or 12 cm. beyond the button into the lower loop



of the jejunum.* The button seemed a little large for the gut, and therefore, in order to support the line of union, a continuous silk Lembert suture was applied over the two anterior thirds of the circumference. Two silk pucker-strings inverted the stomach walls around the catheter, the inner one catching the catheter, the outer one being fixed to the fascia of the abdominal walls, which were now closed by figure-of-8 silkworm sutures.

The operation, including the closure of the wound, took thirty-five minutes. Before taking the patient from the operating-table twelve ounces of thick malted milk were administered through the tube into the jejunum and coffee and water per rectum. The pulse, shortly before the operation, was 132, the respirations 8 per minute. After the operation the pulse was 144; respirations, 5. Half an hour later the respirations were 4 per minute; then at 10.30 P. M. only 3, and at 10.45 only 2, respirations were observed per minute. Some blood was then vomited. Every hour three ounces, alternately, of strong malted milk or beef tea were given into the jejunum. In the night the temperature went up to 101.4° by axilla, but after a very heavy sleep it was evident by morning that oil had been added to the lamp. The next day, April 25th, at 8 A. M., the pulse was 110 and the respirations 7 per minute. Now a new trouble came. At 11 A. M. the patient began to complain of very severe pain and vomited a large basinfull of dark green fluid with apparently a very small quantity of the injected food. An hour later there again occurred this copious vomiting and very frequently during the afternoon, so that the feeding had to be stopped. The gall-bladder drainage yielded only very little bile. Late in the evening, after severe pain in the stomach, a large

*If, instead of the button, I had used the suture method, the tube would have been better pushed even further down into the jejunum, and a very thin and soft tube would have been preferable.

amount of dark green fluid was again vomited. The pulse, however, had come down to 93; the respirations were 13; and the night was good.

The next morning (April 26th) we tried to counteract the vomiting in assisting drainage by having the patient repeatedly sit up for ten minutes with a back-rest, though she was extremely weak. The copious vomiting, however, of greenish fluid kept up. No particles of food were seen in it. It was evident that we had the picture of acute dilatation of the stomach with that well-known abundant secretion into the stomach; but this picture was previously modified by the prompt vomiting and now by our drainage. Could the cause for such cases lie simply in an obstruction of the lower duodenum, the copious fluids being perhaps only moderately increased or even normal quantities of stomach, duodenum, pancreas, and liver secretions combined? The quantity of these four secretions has been found to be much larger than we formerly thought, and to be nearly equal in twenty-four hours to the individual's volume of blood and lymph together. Stomach-washing relieved the patient greatly for some time. The jejunal feeding is kept up, but hardly any pressure allowed. The fluid in the irrigator is kept at a level with the pit of the stomach. For a larger feeding one hour is often required, and no food is administered, if after removing the clamp on the feeding tube there is escape of any amount of the formerly ingested food. There is, however, no discharge of malted milk from the tube one hour after giving four ounces, while one-half an hour after the feeding a little appears on removing the clamp. Cream is added to the malted milk. Either the stomach has very poor contracting power or stomach-contents, slime, etc., have blocked the small amount of space left in the Murphy button, or both factors combine to the effect that apparently all the secretions in the stomach must be washed out

or vomited. Cascara with the feeding causes several defecations. The feeding through the catheter becomes severely distressing; the nausea, vomiting, and weakness again produce a very miserable condition.

I then inserted, on the third day after the second operation, a stomach-tube and removed about ten ounces of bile-stained fluid. Considering this to be digestive secretions it was now mixed with seven ounces of thick malted milk, three eggs, and some salt, and was infused into the jejunum. The same was done in the evening of the same day and twice the next day. This seemed to produce a very favorable change. Four and a half days after the second operations the patient was given buttermilk in sips by mouth and retained it all. It may be that the button became loosened by this time. The feeding, mixed with the gastric secretions, was kept up twice daily. The tube leading to the gall-bladder was removed on May 4th. The patient had by this time begun to complain so much that feeding in any way became almost impossible and had to be greatly reduced. On May 6th the pulse ran high, up to 160 and 168, with a temperature of 101°. The patient was very much depressed and wanted to be left alone to die. We feared that the comparatively large button made part of the trouble, large quantities of blood having appeared in the stools, but it seemed necessary that the feeding be pushed. One quart of cream and milk and three heaping tablespoonfuls of sugar were then given by the tube, and at the same time the stomach was washed and a moderate regurgitated portion of the feeding thus removed. This was repeated every eight hours.

The next day the pulse was very weak—130 to 150. The feeding was kept up. When food was vomited it was given again by the tube. On May 10th she began again to eat a little. On May 11th she was taken out into a chair. On May 12th she ate so nicely that

feeding through the tube was omitted. From then on the patient was up every day and began to feel better and gradually stronger. The tube was removed from the stomach three weeks after the operation, but the button did not pass until sixty days after the operation. This I think was due to its large size. The first weighing, eight weeks after the operation, gave 88 pounds, while the patient had weighed 156 pounds before getting sick.

Now, one and a half years after the operation, the patient is looking well, weighs 121½ pounds, has no complaints except that, when she was greatly overworked, she vomited a few times. She is again in charge of one of the hospital floors.

Contrary to Laffer's views (Annals of Surgery, March and April, 1908), arteriomesenteric ileus has to be considered as an established pathological condition. Two elaborate publications in support of this have appeared this year: Nakahara's, from Enderlen's clinic, in the *Beiträge zur klinischen Chirurgie*, Bd. lxiv, Heft I, and lately v. Haberer's from v. Eiselsberg's clinic, in the *Archiv für klinische Chirurgie*, Bd. lxxxix, Heft 3. Haberer in reviewing the literature says that no case where all other means were fruitless and where therefore surgery had to be resorted to, had as yet survived.

It may be that this combination of gastrostomy with gastro-enterostomy and transgastric jejunal feeding will be of use in some of these and similar conditions.

After the gastro-enterostomy is done the additional gastrostomy with the insertion of its tube into the jejunum is of course a very simple affair and adds certainly much less to the operative trauma than the somewhat bulky title of the paper would lead one to infer.

SECONDARY (POSTERIOR) GASTROJEJUNOSTOMY, FOLLOWING RECURRENT ULCER AT SITE OF ANTERIOR GASTROJEJUNOSTOMY, PERFORMED EIGHT YEARS PREVIOUSLY, TOGETHER WITH A STATEMENT AS TO THE CAUSE OF GASTRIC ULCER

By JAMES F. PERCY, M. D.

GALESBURG, ILLINOIS

Mr. I. J. H., aged 43, American, consulted me in March, 1900, for symptoms that could be referred only to an active pyloric ulcer of the stomach, combined with symptoms of obstruction. It is unnecessary to enumerate these symptoms. His history, extending over a period of four years of invalidism, was the cardinal one that has become so well known by constant repetition in the literature since that day. I urged operation, and the patient passed into the care of one of my Chicago colleagues, who did, by the suture method, an anterior gastrojejunostomy without entero-anastomosis the following June. A report of the operation will be found in the Medical Record (New York) vol. 58, p. 215, Case XI. The patient had a smooth convalescence and an ideal result until January, 1908, when he began to complain of a return of the old distress which made his first operation necessary.

This was his history until March, 1908, when he had a very severe and prostrating hemorrhage from the stomach. It was after this hemorrhage that I saw him again. He had lost practically no weight from his normal previous post-operative weight; however, he looked emaciated and his skin had the indescribable saffron hue so often indicative of malignancy. Under the left rectus muscle, and about two inches from the costal cartilages, could be felt a movable, painful mass about the size of a goose-egg. His hemoglobin per cent at this time was forty; weight, one hundred sixty pounds. He was put under medical treatment and improved in every way until October, 1908, when he had another severe hemorrhage. He had been advised to be re-operated upon, but conditions were such that he could not give consent until the necessity for a second operation became imperative. He improved on the building-up plan of treatment, his hemoglobin increased to 60 per cent, and the mass became smaller and much less painful, but never disappeared. Blood was found in his stools at three different examinations. No analysis of the stomach-contents was made, because of ignorance of the depth of the floor of the ulcer and its character. The danger of perforation of an ulcer from a stomach-tube is probably remote, and yet one is not, in the human subject, anxious to prove that this is so. It is a very inadequate statement of a patient's condition to say that he was suffering from all of the sequelæ of gastric ulcer.

I opened the abdomen February 25, 1909, by excising the scar in the abdominal walls of the previous operation of June 30, 1900. There were three separate and distinct pathological facts presented to the eye: first, an enormous thickening of the efferent and afferent loops of the attached jejunum; second, a perforated gastrojejunal ulcer at the point of the previous anastomosis; third, a complete burial of the pylorus

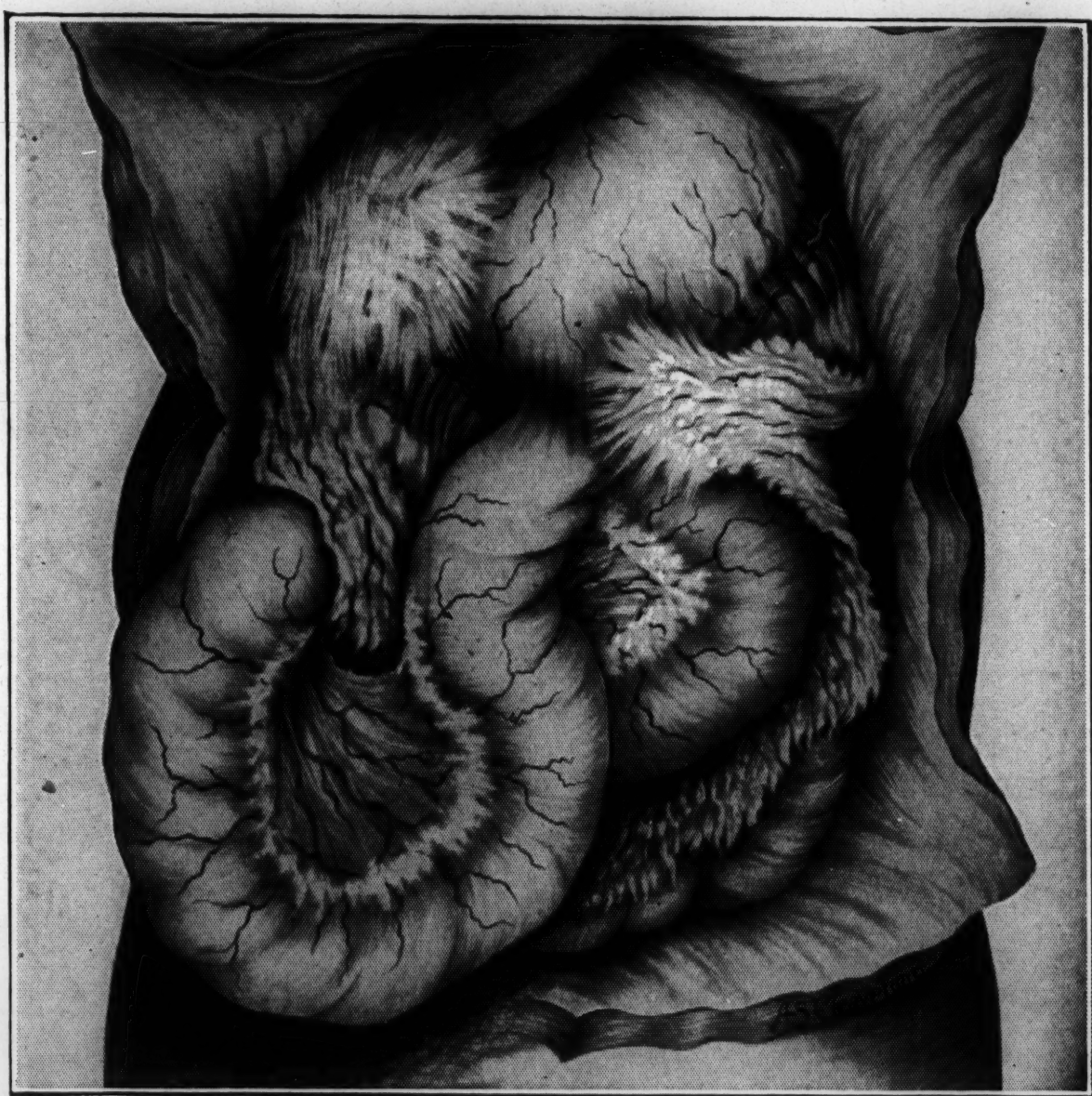


Fig. 1. Hypertrophied jejunum and adhesions in case of recurrent ulcer at site of anterior gastrojejunostomy performed eight years before.

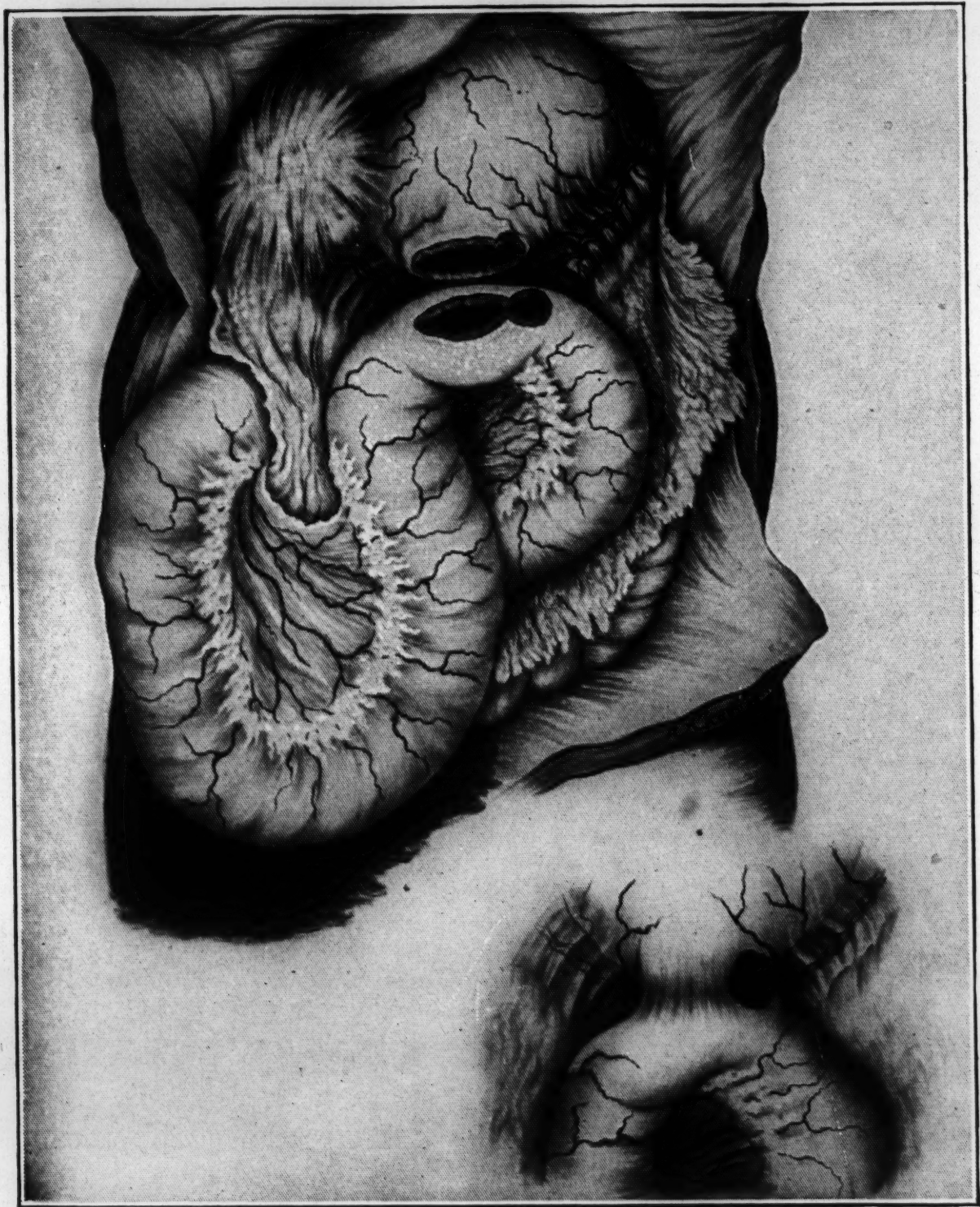


Fig. 2. Lower right-hand corner, perforating ulcer at site of anterior gastrojejunostomy; above, appearance of former anastomosis on separating jejunum from stomach, also, at the right-hand end of dissected anastomosis, perforating ulcer involving both stomach and jejunum.

and the adjacent liver region in a mass of dense adhesions.

The most striking and insistent thing was the hypertrophy of the jejunum. Its walls were fully two and a half inches in diameter. The color was redder (more injected) than normal, and the gut-wall had a juicy or edematous feel and look that were far from natural. It is excellently represented in Fig. 1. Both loops were empty, but very heavy. Manipulation of both the loops reminded me of my boy-hood fishing days, when I succeeded in catching a big eel; i. e., the walls were stiff and thick, and did not have the normal, collapsible feel of the small intestine. The great omentum had been pushed away so that it lay toward the left of the median line, giving an almost unobstructed view of the jejunum. The stomach was not greatly dilated, and its outline was not appreciably changed because of the attachment of what had become an abnormally heavy jejunum. In other words, the stomach was not funnel-shaped.

At the time of the first operation, eight years before, it was reported that the jejunum was so small in diameter that an extra long loop—three feet or more—was necessary before the gut was found large enough to sufficiently serve the purpose of anastomosis. At my operation the afferent loop was not over fifteen inches in length. The extreme thickness of the gut seemed to have been obtained at the expense of the length of the tube necessary at the first operation. Retraction, hypertrophy, and edema would seem necessary to explain the physiological pathology of the process, which would account for the physical appearance of the afferent and probably the greater part of the efferent portions of the gut. This hypertrophy of the efferent part of the gut extended down into the abdomen and was lost to view. It was so big and thick and cumbersome to handle that to learn the full extent

of it would have necessitated the wisely prohibited manipulation against which experience has ruled.

The second striking thing was the ulcer. This had made its way completely through the lower left side of the first anastomosis, involving and destroying not only this portion of the line of union between the stomach and the jejunum, but some of the adjacent structures of both viscera. The diameter of the perforation was easily that of a silver twenty-five-cent piece ($2\frac{1}{2}$ cm.) It had the characteristic look of the acute perforating ulcer of the duodenum, which I have seen a few times; i. e., there was no inflammatory deposit about the margin. The gut was merely open, and with no hint as to how it became so. The edges were not exactly smooth, but they were also not thickened, as in the ordinary round ulcer. Indeed, the tissues at the rim of the ulcer were macroscopically about the same as the rest of the gut in physical appearance. This undamaged look, except for the hole, is very beautifully shown in the specimen of the duodenum removed from another patient, which I present for the purpose of illustrating the character of the perforation in the case, the subject of this paper.

This perforation of the duodenum had no naked-eye pathologic condition. It was merely an absence of tissue. The hole in the stomach of the patient, the subject of this paper, was covered for a space of about two or two and a half inches with omentum. This mass was palpable previous to the opening of the abdomen, and was the spot from which the pain was elicited when pressure was made. The presence of the omentum covering the perforation distinguished this case from the class of perforations in the duodenum referred to above. These latter were not covered with omentum, and no attempt at repair seemed to have been made by nature. In the case under discussion

the omentum had performed its usual life-saving mission.

The third insistent thing, when the abdomen was opened, was the "periduodenitis" referred to in the report of the first operator. This had evidently not grown any less in extent. The liver, gall-bladder, pylorus, and duodenum were buried in a mass of adhesions (also well shown in Fig. 1,) that were beyond treatment, even if it had been theoretically possible, or wise, to attempt anything in the way of treatment.

The problem that presented itself was merely the one of dealing with the ulcer with its history of pain, hemorrhage, and exhaustion. The artificial pylorus was not a problem in the case. It was evidently well made in the beginning; it had not appreciably contracted; it was oval in shape, at least an inch in its longest diameter, and nearly three-fourths of an inch in width. When the protective omentum was removed from the ulcer its diameter increased that of the artificial pylorus at least one-half inch. The easy management of the ulcer was interfered with by the gross pathological condition of the parts. The thickness of the jejunum, with its consequent stiffness and edema, did not encourage reckless attempts at surgery of any kind. To attempt to cover the ulcer by suture did not promise much, because part of the tissue involved was in the cicatrix produced by the previous operation.

I finally decided, from both physiological and anatomical reasons, that the easiest way out of the difficulty was by undoing the previous anterior operation and doing a posterior as a substitute. This was done, and the openings left in the stomach and jejunum are very well shown in Fig. 2. Both of these openings were closed with the Connell-Cushing sutures. The stomach was turned over, and the posterior operation made. The technical difficulties were not slight, because of the great openings left after the parts were separated.

This, with the abnormal thickness of the involved portion of the small gut, together with the edema, made suturing difficult. I made use of the short loop, i. e., in this instance the proximal portion of the jejunum. No sepsis followed; indeed, convalescence and the final result have been in every way ideal.

I report this case because of the extreme rarity of similar ones in the surgical literature of this country. So far as I have been able to learn, it is the first reported instance in any country where a previous anterior operation has later been converted into a posterior, with the use of the short loop. I regret that I cannot give a complete history, chemically, of the stomach-contents previous to my operation on this patient. But, as stated above, I was deterred from making use of the stomach-tube by the fear of increased hemorrhage, or perforation, (should it be used).

But, aside from this lack of important scientific data on the chemical side, there are a good many problems left for us, suggested by the above recital of the history of this case. In the first place, I think we may profitably inquire why this patient had a recurrence of his ulcer. It was certainly not due to faulty technic in his first operation. Eight years of almost perfect health answers that question. Was the ulcer due to a nutritional disturbance in the part of the scar tissue incident to the anastomosis? I do not know, but the following facts at least indicate this as a possibility. The ulcer was on the left side of the anastomosis, and it had destroyed not only the line of union, but some of the adjacent tissues of the stomach and jejunum. This left side of the anastomosis was most likely the point where the greatest tension was exerted by the peristaltic tugging of the efferent part of the gut. This tension may have interfered with the circulation necessary to properly maintain the nutritional integrity

of the gut; hence the ulcer. True, we should remember that this union had been good for eight years. But the patient was also eight years older, and this must exert some influence in scar tissue under a probable constant strain in a patient at the age of fifty-one years. From the physical appearance of the gut, it was more than probable that it was slowly but surely getting heavier. This, again, would tend to limit the circulatory nutrition of the parts, especially in the scar tissue.

However, this is probably only a part of the reason for the recurrence of this ulcer. In looking for an explanation of the reappearance of ulcer after so long a time, and, for that matter, the explanation of the occurrence of all ulcers, either gastric or duodenal, we cannot forget the very plausible theory of hyperacidity. This theory has been given new standing by the very illuminating article by Paterson in the August, 1909, *Annals of Surgery*. True, this writer refers to other possible causes of ulcer, but gives hyperacidity the chief rôle. He has very little to say regarding the part that the infections play in the production of ulcer of the stomach, duodenum, and jejunum other than that produced by the "toxic" action of hydrochloric acid.

In 1904, at the Milwaukee meeting of this Association, it was my privilege to discuss the relationship of the infections of the gall-bladder to the infections of the stomach and duodenum as expressed in ulcer of either or both of these structures. In that paper, viewed in the light of present knowledge, my experiences, and my views based on them, were not well expressed; but the practical significance of the observations of that time have not been changed as to the rôle that gall-bladder infections play in the production, not only of the ulcers under consideration in this paper, but of chronic infections of the liver and pancreas, as

well. A large majority of the cases of gastric and allied ulcers have a history of *chronic* cholecystitis, and I believe that the recurrence of these ulcers, after a well-performed gastro-enterostomy, is due to the persistence of the chronic infection in the gall-bladder, which has not been disturbed or corrected by the anastomosis procedure. If hyperacidity is the cause of the greater number of ulcers, as claimed by Paterson in his most excellent article, why is it that only 33 per cent, in a total of 56 of his patients, had a "diminution" of their hyperacidity? Paterson further claims, as a necessary preventive of hyperacidity following gastro-enterostomy, that the anastomotic opening be ample. Failure to make the opening large will account, according to this writer, for the recurrence of the excess of gastric acidity. It is assumed that in the 56 cases reported as operated upon by himself, this necessary detail in technic was not overlooked; yet I repeat, only one-third of his reported cases showed, as far as they were followed, a lessened hyperacidity.

Is the usual picture painted by the symptom-complex of gastric ulcer and allied conditions in other structures in this region not due to another artist? What were the findings in the case reported here when the abdomen was opened? Adhesions, stasis, and infection. Is it strange that an ulcer should appear in close proximity to a reservoir the fluid contents of which have been shown repeatedly to contain not only an abundance of the colon and typhoid bacillus, but also many other forms of streptococcus and staphylococcus?

The source of the infection of the gall-bladder need not concern us now; but we do need to remember that the typical and characteristic thing about practically every cholecystitis is its chronicity. Acute cholecystitis is a rare condition except when produced by the traumatism of gall-stones. The vast majority of the

cases of cholecystitis are chronic because the bile seems to have the power of limiting the virulence of the poisonous organisms which are contained in it. But when this inhibiting influence is lessened, it is often expressed in the form of ulcer of the stomach or duodenum or jejunum. I believe this to be the rational explanation in every case of ulcer in this region of the abdomen, viz., a previous and long-existent cholecystitis. Hyperacidity may play a late part in these infections, but it is not the leading one. Hyperacidity is a common condition without obstruction, dilatation, or prolapse. Hyperacidity, when long continued, produces a thickened and tough gastric mucous membrane, in other words, builds a wall against itself. Hyperacidity has no analogue in any other part of the body. Destructive hyperacidity is a chemical dream, while bacteria,—some of which do, and others do not, develop in the bile,—form a focus of infection in the gall-bladder that has back of it all the possibilities spelled by the word *infection*.

The case that is the reason for this paper has a known history of cholecystitis for twelve years. The anterior gastro-enterostomy improved his nutrition for eight years to the degree that it was possible for him to overcome the ill effects of his infection. But his anterior gastro-enterostomy in 1900, did nothing to relieve the chronic gall-bladder infection. His gall-bladder was left buried in adhesions. Because of this, peristalsis was inhibited in all these structures, and stasis of infected bile was perpetuated, and the chronic infection remained as a future menace to his stomach and the first portion of his small intestine. This menace of infection again became a certainty when it expressed itself finally by a hemorrhage in March of last year.

As I pointed out in my paper before this Society in

1904,* chronic cholecystitis may also be the "cause of cirrhosis of the liver in an individual otherwise free from the usual history that precedes the average case of this disease, viz., chronic alcoholism," and I give the history of three cases which bear out my statements. These are the cases of cholecystitis in which the liver and pancreas bear the brunt of the infection, and not the stomach or small intestine. To quote again from that paper: "As long as we have ulcer in the stomach or duodenum, or an infected gall-bladder, to furnish a long-continued infection through the lymphatics to the liver and pancreas, we are sure to have, occasionally, a case which will die following operative procedures in the upper abdomen, regardless of the skill with which such operative procedures are conceived, or by whom carried out." Is it necessary for me to add that infections of the liver and pancreas, due to a chronic cholecystitis, furnish a larger mortality, with or without operation, than do the infections in this region which result in ulcer?

In closing, permit me to urge that every case of gastro-enterostomy for ulcer, or its sequelæ, have combined with it drainage of the gall-bladder unless the operator fears that the additional traumatism may add too much of additional danger to the outcome for the patient. This was true in the case whose history I have detailed above. At the present time, ten months following the operation, the patient is in perfect condition in every way. This is true not only as to normal gastric acidity, but weight, hemoglobin, and strength are also normal. *But he still has his chronic cholecystitis.*

The cases of ulcer herein referred to in which cholecystitis is not present are so few in number that they may almost be ignored. I believe that cholecystotomy is practically always indicated, because their

Jour. A. M. A., July 8, 1905.

successful and permanent cure can only thus be secured.

DISCUSSION

DR. L. L. McARTHUR (Chicago, Ill.): I have been very much interested in and instructed by this paper, and I am curious to know whether I made the anterior gastrojejunostomy referred to, as I used to make a number of them.

I am inclined to agree with Dr. Percy as to the influence which an abnormal flow of bile may have in the formation or maintenance of ulcerative conditions in the stomach, and the maintenance of the hyperacidity. The bile is not only the antidote of the acid secretions, but irritation about the gall-bladder will not infrequently influence the condition of the stomach secretions. The theory as advanced by Dr. Percy might be further elucidated by laboratory experiments, and I would like to suggest that he have them carried out.

DR. CHARLES H. MAYO (Rochester, Minn.): This paper by Dr. Percy brings to my mind one thing, and that is ten years ago when there were comparatively few gastro-enterostomies made we heard more about ulcers of the jejunum in proportion than we do to-day. Now, in a good many gastro-enterostomies which we have done and personally observed our experience corresponds to what Dr. Percy has quoted, namely, that when ulcer is formed after an anterior gastro-enterostomy it has been usually at the site of the gastro-enterostomy, instead of lower down in the bowel. Right in that edge or portion of the gut the ulcerative condition is brought about which may lead to hemorrhage and trouble, and yet the condition is rare.

DR. PERCY (closing the discussion): I have nothing to add except to say that I have just completed some laboratory work by which I shall try to prove some of the things that are merely visionary now. I may say, however, that years ago Wernicke did a lot of work on infections of the gall-bladder, but not specially along the line of ulcers.

DIFFUSE SEPTIC PERITONITIS

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It seems safe to assert that in no other line of surgical activity has as much been accomplished during the past decade as in lessening the mortality of diffuse septic peritonitis. Striking as has been the improvement in the treatment of this disease, most has been done by prevention. Since the gall-bladder, the Fallopian tubes, the stomach and intestines, in case of ulcer, and the appendix have been so universally subjected to early operation, thousands of cases of septic peritonitis have been prevented. Every operation done on these organs is a possible prophylactic of a general infection of the peritoneum. Therefore, any report of one's work in treating septic peritonitis is bound to contain fewer cases than if these prophylactic measures were not so frequent. It is a common experience to remove appendices already gangrenous, but not yet perforated, or appendices filled with pus and in imminent danger of rupture, thus averting a spreading infection. It is also a familiar experience to meet with cases having sudden intense pain, followed by shock, etc., so characteristic of an acute perforation of one of the abdominal viscera, and by prompt operation to avert an otherwise inevitable peritoneal infection. A goodly number of such cases have been encountered during the past few years and are not included in this series.

The truly wonderful decrease in the mortality of

acute spreading infection of the peritoneum is due to the recognition of three important factors: first, that the chief absorption from the peritoneum is carried on by the diaphragm assisted by the great omentum. The current normally moves constantly towards the diaphragm and carries toxins directly to the mediastinal glands, thence to the thoracic duct, and thence into the general circulation. The length of time life will continue depends on the virulence of the toxins, the rapidity with which they are absorbed, and the resistance of the patient. The Fowler position, with free tubular drainage from Douglas' cul-de-sac, has proven efficient in turning the current to the opposite direction, thus removing the toxins harmlessly.

The tardy recognition of the fact that the coating of fibrin, pus cells, phagocytes, etc., over the peritoneal surface retards and almost prevents absorption, is the second important element in saving life. The time was, and not so very long ago, when every surgeon felt it his duty to clean the peritoneal cavity of all pus and debris. The more thoroughly he irrigated, the more gallons or barrels of normal salt solution were made use of, the better his conscience felt as he signed the death certificate. Some went farther and injected quantities of peroxide of hydrogen, or even eviscerated, in order to more thoroughly scrub away nature's protecting barriers. It took a long time to learn that when the film covering the peritoneum is removed absorption is so increased that a fatal toxemia is often produced within a few hours. This I have seen in my own experience and have upbraided myself lest the irrigation had not been sufficiently thorough. No irrigation, no rough handling, quick in, quick out, have taken the place of the former heroic methods.

The third important contribution was made by Dr. Murphy in the use of normal salt solution by his efficient method. The benefits of the normal salt solution

will be in the ratio of the skill, patience, and tact of the nurse in charge.

Each case must be studied by itself. The height of the reservoir exactly suited to A may be too much or too little for B. Absorption must be as rapid as the solution is introduced or there will be an overflow with more or less physical and mental distress. Complicated apparatus makes the task of the nurse correspondingly difficult. I have found the simplest possible arrangement of reservoir and tube the most satisfactory, and the least elevation of the reservoir that will produce a current from reservoir to rectum the most desirable. Normal salt solution used as Murphy uses it brings all the benefits that were supposed to be derived from irrigation of the peritoneal cavity without its disadvantages. By increasing the volume of the current towards Douglas' cul-de-sac the toxins are carried away rapidly and so gently that the protecting coating over the peritoneum is not molested. Freer elimination by the kidneys and dilution of the toxins already in the circulation are additional benefits.

There are other factors of only less importance, all of which must be recognized in order to get the best results. The earlier operation is done after the advent of the peritonitis, the lower the mortality. After the first thirty-six hours the mortality-rate will increase in geometrical proportion with each additional twelve hours. The longer the disease has existed the less able will the patient be to withstand anesthesia and prolonged operation, but operation should not be withheld even in advanced cases unless the patient is absolutely moribund.

When conditions will permit, the primary lesion should be dealt with, but in the most expeditious manner compatible with good work. In extreme cases a simple stab-wound above the pubes, with introduc-

tion of a rubber tube into Douglas' cul-de-sac under cocaine anesthesia, may save life.

No matter how much pus may be present I believe more lives will be saved by abstaining from any effort to wipe it out, for, no matter how carefully done, it will disturb the protecting film, more or less, and thus increase absorption.

The transition from the older methods to those of the present, was slower with some of us than with others, and I can include in my series of cases only those operated on since January, 1907. Before that time full recognition had not been given to the factors that I now consider vital, and, though results had been improving year by year, they were not what they should have been and not as good as since the present methods were adopted.

An additional reason for including these cases in one series is, that during the period specified the treatment has been essentially the same in principle.

I do not claim that all these cases had *general* peritonitis, but so far as could be determined without hazarding the patient's life, they could be classified clinically as general. I have tried rigorously to exclude all cases of local peritonitis, of small or large localized abscess, of gangrene with only local infection of the peritoneum, as well as all cases of acute perforation when operated on before the advent of peritonitis.

After the exclusion of all these cases which cannot rightly come in, my records show that since January, 1907, I have operated on thirty-nine cases of diffuse septic peritonitis with three deaths. Thirty-five were due to appendicitis, with one death; two were caused by the perforation of a typhoid ulcer, with one death; one was a case due to puerperal sepsis with an immense amount of free pus in the peritoneal cavity.

This woman recovered, and there was one case of perforating duodenal ulcer ending fatally.

Twenty-eight cases were males and eleven were females. The average age of all the cases was twenty-six years and ten months. The youngest patient was a little boy aged five years, and the oldest was a woman aged fifty-eight years, the only fatal case due to appendicitis.

The appendix was removed at the primary operation in thirty-two cases. In the remaining three the condition was so serious that it was not thought prudent to do more than simple drainage, and the appendix was left. Two of them have had their appendices removed by subsequent operations. The third one recovered and is still carrying his appendix, but intends entering the hospital to have it removed this winter.

In four cases fecal fistulæ persisted, which were cured by subsequent operation. There have been two cases of ventral hernia operated on, and I know of two others with hernia which will be operated on if troublesome. There are probably others, as I believe ventral hernia is frequent after such prolonged drainage. There has been no case of intestinal obstruction following these operations.

It is only fair to state that the period of convalescence has extended in a few cases over a number of weeks, and in two of them four and five months, respectively. In the greater number the convalescence has been comparatively brief, not longer than we expect after opening an appendiceal abscess.

Detailed reports of the three fatal cases are as follows:

CASE 10.—J. L. W., male, aged 43 years. Was brought into Immanuel Hospital on Nov. 1, 1907, in the third week of typhoid fever with a history of acute abdominal pain followed by shock occurring three

days before. Temperature was 103.5° ; pulse, rapid, weak, and thready. The abdomen was immediately opened to the outer border of the lower end of right rectus. Quantities of fecal matter and pus welled out as soon as the abdomen was opened. All coils of intestine were deeply inflamed. As patient was so nearly moribund no search was made for the perforation, but a stab-wound was made above the pubes, a large rubber tube introduced into Douglas cul-de-sac, and another tube into the right flank. The patient was put in the Fowler position with ice over the abdomen, and stimulants and normal salt solution were given per rectum. The pulse was almost imperceptible at the close of operation. The patient rallied, and for several days it looked as if he might survive, but he sank and died of sepsis on November 11, 1907, ten days after the operation.

CASE 27.—C. E. A., male, aged 37 years. Patient was first seen by me at his home in Clarinda, Iowa, on the morning of July 10, 1909, with his physician, Dr. Powers, who gave me the following history: For several months the patient had been suffering from severe pain, beginning two or three hours after meals and leading to the diagnosis of duodenal ulcer. Five weeks ago he had a very serious hemorrhage, vomiting a large quantity of blood and passing a large amount in his stool. He was greatly exsanguinated at this time and was seen by Dr. W. O. Bridges, of Omaha, who recommended operation as soon as he had sufficiently recovered from the hemorrhage to stand it. He improved slowly and had been confined to bed most of the time since. On the evening of July 8th he ate more freely than usual, and at 2:30 A. M. of July 9th he was suddenly seized with severe pain in the right epigastric region, followed by collapse and very soon abdominal rigidity. When I saw him first, at 5:30 A. M., July 10th, twenty-seven hours after the onset of

pain, the abdomen was still rigid, but not so much as it had been, Dr. Powers told me. There was some deep tenderness all over the abdomen, slightly more marked over pyloric region, and his temperature was 101° , and pulse, 120 and thready.

Operation was performed one hour later, 6:30 A. M., July 10, 1909, twenty-eight hours after the perforation. Dr. Powers assisted; Dr. Phillips gave ether; and Drs. Witte and Moon were present. An incision was made splitting the upper end of the right rectus muscle. As soon as the peritoneum was opened a large amount of gastric juice and pus poured out, and a good deal of fibrous exudate was seen on the coils of the intestine and the stomach. A perforation of the duodenum just in contact with the pyloric valve was located, the opening being large enough to admit the finger. It was closed by infolding by means of two superimposed sutures of Pagenstecher. The patient was so weak that no gastro-enterostomy was done, though, within due limitations, I believe this should be the rule. With the left hand in the abdomen a stab-wound was made over the pubes through which was inserted a very large rubber tube, which was guided to the bottom of Douglas' cul-de-sac and held in position with a silkworm-gut suture. A cigarette-drain and a strip of gauze were inserted in the upper wound to drain the region of the ulcer, and the lower end of this wound was closed. The shock was severe, but he rallied promptly. He was placed in the exaggerated Fowler position, and proctoclysis by the Murphy method was carried out very methodically by Dr. Powers.

Two days later, July 12th, Dr. Powers telephoned me that he was resting easily with a temperature of 98.5° and a pulse of 78. There was some distension, but it was not excessive. During the next week he

was getting along nicely until he had another copious hemorrhage. After this he never did well. More or less fever was present, and he gradually sank and died on August 1, 1909, three weeks and one day after the operation.

Autopsy.—Dr. Powers reports to me that at the autopsy the peritonitis had entirely healed, and the sutures used to close the perforation had held, and there had been no leakage. The ulcer had not healed, and an abscess was found in the liver containing a pint of pus.

CASE 32.—Mrs. J. H., female, aged 58 years. For several months the patient has had at times some pain in the right lower quadrant, but never had to go to bed. On September 15th she had severe pain, but kept about the house. On September 16th, the pain came on much worse with vomiting, and she was confined to the bed. She was brought to Immanuel Hospital that evening with great rigidity of the abdomen and exquisite tenderness. I saw her first the morning of September 17th. The abdomen was distended and rigid with tenderness all over of an extreme degree. Immediate operation followed. As soon as the peritoneum was opened pus welled out and all coils of intestine were intensely inflamed, but no fibrinous deposit was noted. A gangrenous and perforated appendix was quickly removed, and gangrenous spots were found on the cecum. A stab-wound was made above the pubes, and a large rubber tube was introduced to the bottom of Douglas' cul-de-sac. A rubber tube and strips of gauze were used to drain the appendiceal region and to guard the peritoneal cavity in case of leakage from the cecum. She was put in the Fowler position, with ice over the abdomen and normal salt per rectum, introduced slowly and constantly. She

continued to grow worse, though her bowels moved, and she died on September 22d, five days after the operation, with all symptoms of general septic peritonitis. No autopsy was permitted.

FOR DISCUSSION SEE PAGE 97

THE PRESENT STATUS OF THE TREATMENT OF DIFFUSE PERITONITIS

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In speaking of the results of the treatment in diffuse peritonitis as outlined by Le Count, formulating the treatment as practiced by Murphy, Johnson says: "It has taken the despair out of this disease as antitoxin did out of diphtheria, and has relegated it to about the same category as diphtheria under antitoxin treatment."

This very optimistic view is so much at variance with the results of laboratory research and with my own clinical experience that I have thought it of interest to study the literature of the new treatment for the purpose of a comparison with the scientific researches upon the peritoneum. Obviously, if such improvement in prognosis has taken place as the above quotation supposes, some phase in the treatment, as the antitoxin in diphtheria, must be fundamental. If such is the case experimental research may as well cease. This is the question I desire to examine by a study of the literature, both practical and scientific.

As a basis for my examination I have taken the paper of Le Count because it was the first public utterance in this country of what has become popularized as the Murphy treatment. I shall present an abstract of the various steps, as outlined by Le Count, together

with a brief explanation of their mode of action, as accepted by the advocates of that treatment.

1. The removal of the cause. The importance of the removal of the cause is to prevent a continuance of the source of trouble. The removal of the cause consists usually in closing an opening from the gastro-intestinal tract.

2. The Fowler position. By raising the upper portion of the patient's trunk the abdominal exudate is made to flow out of the drainage opening at the lower part of the abdomen. The to-and-fro movement of the diaphragm imparts a movement to the intestines, which acts as a pump, forcing fluid out with each inspiratory movement of the diaphragm.

3. Brevity of the operation. Patients with diffuse abdominal inflammation are known to bear prolonged operations badly, and it is sought to preserve the resisting powers of the patient by terminating the operation as speedily as possible.

5. Colonic infusion. Salt solution is introduced into the rectum under low pressure, so low that the bowel is not excited to contraction. In this way large quantities of water are taken up by the bowels. This increases the fluidity of the blood, making the heartbeats stronger, eliminates the poison through the urine, and, above all, causes a reverse flow from the lymphatics into the peritoneal cavity. Thus, instead of toxins being taken into the circulation, the poison is eliminated into the peritoneal cavity where the Fowler position and the pumping action of the diaphragm causes the toxin-laden fluid to escape from the body.

6. Withholding food and fluid by the mouth. This prevents the excitation of peristalsis, which bringing food and liquid into the stomach produces.

I propose now to consider in turn each of these steps, in order to determine upon what basis they

rest, whether clinical experience, laboratory experimentation, or library speculation.

1. The removal of the cause consists usually in the closure of some perforation, be it an ulcer of the stomach, the duodenum, or the appendix. If still active the removal of the cause is imperative. This is true of perforative ulcers where intestinal contents continue to pour out. The same is true in appendix perforations without any protective adhesions. Where the cause is still active, which implies the absence of adhesions, this can usually be accomplished in the required six or eight minutes if an accurate diagnosis was made prior to operation. When, however, adhesions have formed about the cause (e. g., about the appendix) the removal may be more difficult. It may be safely stated that just in proportion as the removal is difficult, because of adhesions, its removal is unimportant. It would seem that the removal of the cause is not a rule of universal application.

2. The Fowler position. If it is admitted that the position is effective in accumulations in the lower abdomen it is difficult to apply the same line of reasoning when the upper part of the abdomen is involved. Consistence would seem here to demand the Clark position. Even in cases in which the lower part of the abdomen is involved the universal utility of the position as a means of promoting drainage cannot be admitted. If the amount of fluid is great enough to raise up the intestines or the abdominal wall from the intestines, if these are not fastened by adhesions, the raising of the upper part of the body will increase the flow. These conditions are rarely met in peritonitis. With a moderate amount of fluid the abdomen resembles a vat with a number of compartments, the different compartments being formed by the contact of the distended intestinal loops against the abdominal wall. Above each intestinal coil fluid is retained. This

effect is increased if the intestine is distended with gas. If there is fibrinous exudate with adhesions and agglutinations these compartments are made absolute. Animal experimentation has abundantly proven that gravity cannot be depended upon to remove fluid from the abdomen, whether healthy or diseased. The aid gravity is believed to receive from the pumping action of the diaphragm is difficult of explanation. The patient makes every effort to prevent movement of the diaphragm, and the movements imparted to the abdominal contents by the respiratory act would seem to be confined to the anesthetic period of the operation. When adhesions form, which certainly takes place soon after the drain is placed, they would certainly negate such action. Respiration expels no fluid in animals. That there are special openings in the diaphragm making absorption here more rapid and that there is a stream of fluid toward the diaphragm is one of the curious fallacies perpetrated in modern surgical literature. The stomach has finally been accorded a much-needed oblivion, and the notions quoted above will share an equal fate as soon as surgeons shall take the trouble to report some very simple operations in the anatomy of the peritoneum. When this occurs the Fowler position will have lost one of its most important functions. Blake ascribes the chief use of the Fowler position to the lessening of pressure upon the diaphragm. With this view as a principle I heartily concur.

3. Brevity of operation. This is a generally accepted principle in surgery and admits of unlimited application. It is not always possible, however, to harmonize it with the first requirement, namely, the removal of the cause. Ofttimes the cause cannot be removed in a few minutes. Either this principle or the first must then be compromised.

5. Colonic infusion. Experience taught that the

practice formerly followed, the introduction of salt solution into the subcutaneous tissue or into the veins, instead of being useful, was deleterious, because of the too rapid filling of the vessels. The slow introduction of fluid under low pressure into the rectum obviates the objection, though it must be remarked the amount actually taken into the system from the rectum is as great, according to the advocates of the new method, as was the case when the fluid was introduced by hypodermoclysis, but without the deleterious effects. The discrepancy has not been explained.

It seems of interest to trace the history of the rectal route of salt water introduction and the theory of its operation, in order to determine the basis upon which it rests. So far as I can determine the paper which excited the interest of the profession in this method of introducing fluid, was by Wernitz, published in 1903. A careful perusal of this paper fails to reveal any real evidence, but a large amount of speculation as to the effect of salt solution in causing the elimination of toxins. The entire paper bases itself upon a puerperal and two incomplete abortion cases which have nothing whatever to distinguish them from ordinary cases of sapremia in such conditions which we are accustomed to see recover under the treatment of removal of the decaying placental remains, as was done in this case without his salt solution, yet he ascribes the entire result of the treatment to the use of salt water per rectum. No details accompany the report. In 1906 Katzenstein, based on these experiments of Wernitz, employed the treatment in peritonitis following perityphlitis. He prefaces his article by admittedly theoretical speculation in the pathogenesis of peritonitis. He assumes that in severe cases of peritonitis because of the hydropenia of the organism there is thickening of the blood, and because of the rapidity of the course of the disease there is fibrinous exu-

date. The introduction of a large amount of fluid causes, according to him, an exudate of fibrin from the peritoneum. He gives the technic advised by Murphy. This paper is followed by Kothe in 1907. He accepts the speculations of Katzenstein as correct and adds the following: Salt water does good, first, by lessening the thirst; secondly, it raises the blood pressure (he quotes Weisinger approvingly in assuming that it is the dilated mesenteric vessels that lessen blood-pressure, compelling the heart to work empty and thus compelling an increased rate); third, it increases diuresis (he quotes Ecklentz as showing that a rapid exudation of poison was brought about, though that author expressly states that increased elimination of bacterial toxins did not take place); fourth, nutrition may be added to the salt solution. He states that the solution was well borne in the beginning of the disease. He used as much as twenty-two liters in a "short time" (time not stated). He bases his paper on twelve cases of "diffuse progressive peritonitis." These cases came under treatment in two to ten days after the beginning of the disease. In five of these there was an abscess in Douglas' pouch. Two were subphrenic abscesses; one, intestinal atony requiring enterostomy; and in four the condition is not stated, but they came to treatment on the fourth, fifth, sixth, and tenth day, respectively. The date on which the patients came to treatment, together with the temperature and leucocyte findings, indicates that the cases belong to my third group and not to the diffuse progressive type.

I desire particularly to call attention to the fact that the statement that an exudate can be caused to take place upon the peritoneal surface, is the result altogether of theoretical speculation. It has not a single basis of fact and is diametrically opposed to all laboratory experiments. Blake, in the best paper on this

subject I have been able to find in any language, correctly negatives the supposition above quoted by a proper presentation of the proved evidence in the case.

I have been unable to find any specific evidence of the amount of fluid that can be absorbed by the rectum. The entire evidence consists of general statements, by eminent men it is true, but eminence of the author is never a satisfactory substitute for definite data for subsequent workers.

A summary of the evidence relative to the points above reviewed would appear somewhat as follows: In some instances the removal of the cause is imperative; in others impossible compatible with a speedy operation and in such instances unnecessary. The Fowler position is limited in its operation, and when the upper abdomen is involved it is useless. Men equal in eminence with its advocates deny its specific action. The value of the rectal salt infusion consists in watering the individual without disturbing his stomach, and does good by increasing the volume of circulating fluid, but not great enough to over-burden the heart. It does not cause an exudate upon the peritoneum, and there is no evidence that there is an increased elimination of toxins by the urine or elsewhere. Withholding fluid by the mouth is indicated, and since nausea usually prevents absorption it is useless. There is no evidence that the injection of food or fluid into the stomach increases peristalsis of the inflamed intestine.

To what then is the improved prognosis due?

1. To earliness of the operation in really perforative cases.
2. To better diagnosis, so that the cause may be removed in a short time while yet an active factor.

The improvement in prognosis is not as great as some recent reports would have us believe. Unfortunately most of the cases reported by American writ-

ers have no case-reports attached. From the foreign papers one notes the disposition to group cases of diverse character. A satisfactory classification cannot now be made, but there is no need of classifying a pelvic or subdiaphragmatic abscess along with a diffuse peritonitis resulting from the rupture of a duodenal ulcer. So far as case-reports permit one to judge, aside from the two points mentioned above, the prognosis has been much improved by the addition of cases of less gravity to the list of cases of diffuse peritonitis. So far as specific evidence is available, neglected and badly operated cases die in spite of the Fowler position and salt by rectum.

As a basis for a better grouping of peritoneal cases I would suggest the following classification:

1. *Acute Perforative*.—Where suddenly the wall of a hollow organ is destroyed. This may be due to traumatism, a gunshot wound, or puncture, or to a local necrosis, causing a portion of the wall to become destroyed. The essential is that there shall be no reactive inflammation about the seat of the perforation before the escape of the contents, therefore no protection against the invading organism. The results are the same as if a culture-tube were poured into the freshly opened abdomen. In this type the region of perforation determines the character of the disease, and the time of operation the prognosis.

2. *Acute Progressive*.—In this type there are no or only imperfect adhesions about the point of rupture, but there has been inflammatory reaction about the seat of rupture. While in this type the contents escape into the abdomen, slightly or not at all protected by adhesions from extension, the peritoneum itself has undergone reactive changes consisting in the exudation of leucocytes and serum which has become formed into the granular type of fibrin, or has the potential for such function. In this type the kind and character of the

organism and the nature and degree of reaction of the peritoneum prior to rupture determine the type of disease and the time of operation the prognosis.

3. *Imperfect Encapsulation*.—This type represents the preceding, except in degree. The peritoneum has reacted to irritation before the escape of the infection, and the reaction is of a greater degree. The infection is not so severe as to destroy the fermentative action of the exudate so that the formation of fibrin is possible. With this formation an encapsulation takes place, except at a certain point where, owing to the intensity of the infection or to the lessened ability of the tissue to react, or that the infection extends beyond the zone protected by preliminary reaction, such encapsulation cannot take place. The peritoneum itself has the greatest reactive power, while fatty tissue has little or none; therefore when infection gains access to these tissues the tendency to limitation is not great. Regions inaccessible to the omentum likewise are less likely to encapsulate. Hence the greater likelihood to extension external to the colon and across the pelvis.

The Ochsner treatment has taught us that many cases of peritonitis which appear at first to be diffuse afterward become limited. In fact, it would not be too much to say that all peritonitides are diffuse in the beginning. Some become limited, others partially so, others not at all. In a case which has the potential to become limited, if operated on when yet diffuse, a better prognosis is evident than in cases which do not have the potential to become self-limited but are operated on at relatively the same period of their development.

4. *Perfect Encapsulation*.—In this type the reaction has reached to a still greater degree. Adhesions form all about the area of infection with a complete protection of the surrounding peritoneum. At one stage of

the disease this type, too, was diffuse and unlimited, but with the potential to limit itself.

Based on this classification the prognosis at the present time, judged from the reports in recent literature where the case-reports are complete enough to permit a classification, is by groups as follows:

1. The prognosis of this group, based on Gerster's recent statistics is as follows: intestinal perforation, 76.4 per cent; strangulated hernias, 87.5 per cent; female genitals, 66.6 per cent; typhoid perforations, 73.9 per cent; stomach and duodenal perforations, 46.1 per cent; liver abscess, 66.6 per cent; hemorrhagic pancreatitis, 83.3 per cent; undiagnosed, 70 per cent; giving a general rough average of a mortality of 70 per cent. These figures correspond closely to similar cases in other reports.

2. This group, comprising the most of the acute perforative peritonitides, gives a mortality of less than 15 per cent. Those rare cases of appendicitis where there is a necrosis without a previous inflammatory reaction, is the first group with a prognosis correspondingly grave.

3. The majority of cases in this group, if given time, become encapsulated, forming because of the imperfect encapsulation a pelvic, a subdiaphragmatic, or other secondary abscess. The cases reported are not distinctly enough defined to permit a very definite guess at the prognosis, but it is probable not much over 5 per cent, unless secondary abscesses in distant regions, as in the lungs and liver, are permitted to occur, and in such instances the secondary localization has a prognosis entirely its own, which must be taken into account.

4. This group, the completely encapsulated, or having the power to become encapsulated, if given time, with or without the Ochsner treatment, if drained before complications arise, has little or no mortality.

It is only by a separation of the severe from the milder cases, together with a detailed report of each case upon which statistics are based, that an adequate comparison between the clinical and the laboratory findings can be made. The mere publication of numbers cannot further the study of abdominal inflammation. Unless accompanied by exact data such articles can be regarded merely as expressions of opinion and are of no great value as evidence to workers in surgical science.

DISCUSSION OF THE TWO PRECEDING PAPERS

DR. R. C. COFFEY (Portland, Ore.): It was left for Fowler to make that very startling and extraordinary discovery that fluids will run down hill. Why the doctor proceeded to drain at the very highest point in the abdomen is something I think will be difficult to explain, except by our tendency to hang on to those fallacies that have existed from the middle ages. I remember seeing very early, and practically only recently, a doctor drain at the point of the base of the appendix with the idea that sufficient drainage could be established here. The patient died, and some discussion arose as to whether or not drainage was of any value. It was claimed by some that drainage was of no value because these patients died, but after a while Fowler made the great discovery that fluids will run down hill, and that it was very essential to drain, and later on Murphy and others discovered, clinically, at least, that we had to make fluids run down hill very rapidly in order to get good and satisfactory results. Later, I took up this work in an experimental way. I took a cadaver and filled it with plaster-of-Paris and found that the right flank is at least four or five inches deeper with the patient lying on his back than the point at the base of the appendix. There was also another cavity on the left side, and another shallower one in the pelvis. I took up the subject and went back to the two most important papers which had come to me, namely, those of Clarke and Yates. They made important observations, but their deductions were not in accord with clinical facts as we saw them at that time. For instance, Yates took up the matter and concluded that drainage was of no use. He put in drainage and observed the fact that there was great pouring

out of serum at that point, and he said this is not pus, therefore it is not necessary to drain. Both Clarke and Yates came to the conclusion that drainage was practically of little or no value. Yates said gauze would not drain, for the reason that you can take it and put it in a basin and blood will not run over the edges of the basin like water, neither will pus, but if you pour pus into the abdomen and put in gauze drainage you will find it is all delivered to the surface, not in the form of pure blood, nor in the form of thick pus but in the form of a faintly colored red fluid on the one hand and by faintly colored yellow fluid on the other hand. The presence of a foreign body of any kind produces mechanical irritation and causes a pouring out of serum in proportion to the extent of contact of peritoneum with the foreign body below. The serum dissolves the blood-clot and pus, and it is delivered to the surface. All experiments on this cadaver proved that the patient would have to be lifted fifty-one degrees to get the flank level where it would have to cross out over the psoas muscle. In order to get drainage, therefore, by means of the Fowler position this position must be exaggerated. In fact, almost a sitting posture is necessary, but the point of drainage in these acute perforative conditions will depend largely upon where the perforation takes place. For instance, in a perforation of the gall-bladder or a perforation of the duodenum, as a rule, drainage established in the right flank is better, while in perforation of other viscera it does not make much difference whether the fluid is gravitated to the right or left side. For instance, in a case of perforation of the stomach near the median line, or in which the patient has been transported and rolled from side to side, it is essential to use the Fowler position because in sitting patients straight up you get the fluids to gravitate to the bottom.

Another important feature I wish to call attention to is drainage at the point of intestinal suture. If you suture a perforation of the intestine, and that intestine is allowed to come in contact with drainage, you are likely to have a fecal fistula; therefore, it is a very important thing to make the drainage remote from the point of suturing. It is also important that you lift the intestine away from the drain and not thrust the drain down irrespective of its relation to the intestine. The intestine should be lifted well up so that you can see the position the drain is in and protect the point of suture from this drain. For instance, let us take

the pelvis of the female, where the ovaries or tubes form the most frequent point of attachment for subsequent adhesions. In these very violent cases of peritonitis I usually use a quarantine drain. I pack the pelvis and line it with wicks of gauze and then put a smooth layer of rubber tissue in above, and that prevents adhesions from forming to the uterus and ovaries.

DR. VAN BUREN KNOTT (Sioux City, Ia.): I wish to agree with what has been stated by Dr. Coffey, that probably the Fowler position has had more to do with our recent success in the treatment of diffuse septic peritonitis than any other method of treatment which has been employed, although this is somewhat in opposition to the views expressed by Dr. Hertzler, that early diagnosis and prompt treatment of these cases are to be held responsible very largely for our success.

In 1902 I was very deeply impressed by Dr. Fowler's paper in which he advocated the Fowler position in cases of acute peritonitis. Up to this time nearly all of my cases of acute septic peritonitis died, and after I began to employ the Fowler position in subsequent cases my patients began to get well. In the same year I read a paper before the Association advocating a stab-wound in the median line in the lower portion of the abdomen and drainage of the rectovesical pouch in males, with drainage through the vagina in females, in these cases of diffuse septic peritonitis. Since that time this method has been invariably employed by me except as regards the stab-wound. In cases where the original incision has been made through either of the recti muscles or the median line below the umbilicus, this incision is continued downwards sufficiently to enable the tube to be easily placed in the lowermost peritoneal pouch. Further experience has demonstrated that irrigation is unnecessary in the vast majority of these cases; and it has for that reason been largely omitted. Then came the recommendation of Dr. Murphy for the use of slow rectal saline solution, with which you are all familiar. This method improved still more the already favorable results.

We are not so much afraid of peritonitis as we were formerly, I should much prefer to treat a case of diffuse septic peritonitis in the first few hours, due to perforation of short duration, than a localized appendicular abscess. In order to get the benefits of drainage it is necessary to separate all adhesions, so that the septic fluid in the abdominal cavity

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will gravitate into the lower pelvis, and that has completely revolutionized our treatment of cases of appendicitis with localized abscess. We now have no hesitancy in separating adhesions and removing the appendix and draining through the lower portion of the peritoneal cavity, namely, the rectovesical pouch or Douglas's pouch.

Drainage of the abdomen can be simplified very much. In all cases of localized abdominal infection it is wise to drain locally. In all cases of general abdominal infection it is wise to place the patient in the Fowler position, the head being raised thirty inches or the patient being in the sitting-posture. If that is done the septic fluids will gravitate to the lower pelvis, and one drain properly placed will evacuate the fluids. The placing of numerous drains means the establishment of multiple adhesions and increases the post-operative complications. A properly placed drain in the lowermost pole of the peritoneum will not produce adhesions sufficiently marked to cause obstruction.

DR. DANIEL N. EISENDRATH (Chicago, Ill.): There are one or two points in the pathology and etiology of peritonitis which, so far as I remember, neither Dr. Davis nor Dr. Hertzler referred to; and as a few of these cases have come under my observation during the past three or four years I thought it might be of some interest to relate them here. These are the cases in which we have a genuine peritonitis, so far as the pathology is concerned, without visible perforation of the appendix or of any other viscus. They are not cases in which perforation of the duodenum or stomach has been overlooked, but cases in which streptococci have migrated along the lymph-channels through the appendix wall and into the general peritoneal cavity. These cases have occurred, not only in my own practice, but in looking up a series of them which we had at the Michael Reese Hospital in the past ten years I find that there were two of my own and two or more cases of Dr. McArthur, Dr. Andrews, and Dr. Greensfelder. Altogether there were seven cases in this series. In addition there have been quite a number of cases reported in the literature by men like Sprengel, in his book on appendicitis, and Martin of Philadelphia, who, in an article two years ago in the *Annals of Surgery*, called our attention to these cases of peritonitis without visible lesions.

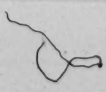
A second source of peritonitis which we not infrequently overlook, occurs in little girls, the origin of the general peritonitis being an infective salpingitis. Riedel has recent-

ly called our attention to this not infrequent source. He held autopsies on nine little girls who had died of general peritonitis in spite of operation, and found no perforation of the appendix, but only a very marked and intense salpingitis. It is unnecessary to explain these cases of salpingitis upon any gonorrheal theory, as a good many of them had no gonococci, but simply streptococci and staphylococci, which, through lack of care, on the part of parents, migrate from the uterus through the tubes up into the peritoneal cavity.

I have been quite astonished at times, and at others disappointed, in regard to some of the results from the treatment of cases of general peritonitis, and a very interesting point was brought out by Dr. Davis in this connection, namely, that there is undoubtedly a variation, as we all know and see clinically, in the toxicity of the organism. With this variation in the toxicity of the organism we also find a variation in the pathological changes. We can operate on some cases of general peritonitis, and this is especially true of children, where there are practically no visible changes, or the changes are very slight, and these cases will die in spite of carrying out the same treatment which we find successful in forty-nine cases out of every fifty. Every little while we see cases of this kind where we carry out the same treatment, and yet these children will die in spite of everything we do. In some of them we are apt to feel that we do not want to operate on these cases of peritonitis advanced to the third or fourth degree where the children seem septic, but leave them alone and tide them over for an interval operation.

I want to endorse the point brought out by Dr. Knott in reference to the use of bulky drains which we use in the lowermost point of the peritoneal cavity. The more we understand the principles of draining the peritoneal cavity the better it will be for us. It has been shown experimentally that practically few drains will work outside of the immediate territory in which they are placed after from six to twelve hours. No drain will accomplish much after the third day. What we wish to accomplish is usually done in the first twelve or twenty-four hours.

Another point I wish to speak of relates to the removal of the appendix. I have followed the policy during the past two years that in recent cases, if the operation does not involve the separation of adhesions which may lacerate the coats of the bowel, I look for the appendix and remove it.



DR. C. H. WALLACE (St. Joseph, Mo.): It seems to me that in these cases the extent and nature of the pathological condition should always govern us in deciding whether or not we should drain. We notice that in these cases, if there is perforation of the appendix or a perforation of any hollow viscera, if we operate within the first twenty-four or forty-eight hours, the question of drainage is a minor one if you remove the pathological condition and close the opening at the time. Dr. Blake demonstrated this point in a paper recently published, where he closed the peritoneum and drained down to the peritoneum for the purpose of draining any infection which might take place in the wound.

Dr. Coffey spoke of one thing I wanted to refer to, and that is drainage in the chronic or more extended cases where the material becomes organized. It is very difficult to establish drainage in such cases and have it very effective. We know there are a class of cases that become so septic that we get no drainage, and it does not make any difference what we use as drainage material. The wound looks like a wound in a cadaver. There is no exudation of serum, and in this class of cases drainage fails to accomplish anything because they are usually beyond all hope. But if the case is of a more chronic type, chronic abscess, I think drainage, as Dr. Coffey has well said, is indicated, and his theory of drainage is a very excellent one.

DR. DAVIS (closing the discussion on his part): I have very little to say. With reference to the remarks made by Dr. Coffey in regard to the discovery of Dr. Fowler that fluids run down hill: I heartily agree with him, although Dr. Hertzler rather definitely proves that water does not run down hill, but that it stays in cavities. My idea about it is this, that the larger the amount of fluid the freer the circulation. I cannot from the practical clinical side agree that there is no increase in fluid in case the Fowler position is adopted with proctoclysis. I have had two observations along this line where we found it difficult to make use of proctoclysis on account of lack of knowledge, and where there was a comparatively small amount of fluid. Just as soon as these cases got good thorough proctoclysis we immediately saw an increase in the amount of discharge from the wound.

In regard to the Fowler position, I use it in many cases which I would not consider as diffuse septic peritonitis. Whenever I see a case in which I feel there is danger of a

more generalized peritonitis, I use it, and I thoroughly believe, as Dr. Knott has said, the Fowler position has done wonders in limiting or lessening mortality.

In regard to the matter of placing the drain which was touched on by Dr. Coffey: I have been able by introducing my hand down into the pelvis, holding the intestines back, to insert a drainage-tube, which is passed through a stab-wound above the pubes directly down into the bottom of the cul de sac. I fasten this tube by means of a suture so that it cannot slip farther down or up, and thus it fits nicely at the bottom.

With regard to the time of drainage: Drainage does not last very long. I believe the experimental work of Yates and Murphy, done years ago, shows that in animals, dogs, etc., everything is walled off within a few hours. I do not believe we can take that work as positive evidence that in a case of general peritonitis we do not get drainage for a longer time. I believe we do, but it is limited in time. Where we have diffuse peritonitis, drainage will continue longer; adhesions will not occur so soon as in a case where the peritoneum has been healthy up to that time.

DR. HERTZLER (closing the discussion): As Dr. Coffey has rightly said, Fowler discovered that fluids will run down hill, but the profession has not yet discovered that they will not run down hill when opposed by a greater force. When Dr. Coffey's paper first came out a few years ago I repeated some of his experiments and I found this: With a dead man in the Fowler position drainage will occur, because the intestines are empty and lie flat, but in a live one it will not for the reason that the intestine distended with gas forms a dam, which counteracts the force of gravity.

As to how long a drain, properly placed, will drain: That depends on certain factors. If the fibrin-forming element is destroyed it will drain for a long time, but if it is not destroyed the time will be shorter in proportion. If the fibrin-forming elements are increased by previous preparatory reaction, you get perfect encapsulation in two hours.

With reference to the use of the Fowler position, I want to say this: There are men who do not use the Fowler position, and yet they are getting just as satisfactory results as those who use it. How can we harmonize the results? It must be done by a collective statistics of the work of men who use the Fowler position and of those who do not. If

the men who make early diagnoses, operate quickly, and drain, but do not use the Fowler position, get equally as good results as those who do use the Fowler position, we must conclude that the essential factor is something other than the Fowler position. The same holds regarding salt water enemas.

FURTHER OBSERVATION ON ENTEROSTOMY AND ITS TECHNIC

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At the last meeting of this Association the writer had a paper entitled "The Value of Enterostomy in Intestinal Obstruction," and reported four successive successful cases. Since that time four more enterostomies have been done by him for obstruction, and all of these cases are dead.

Case 1 of this fatal series was done on New Year's day of the present year, for obstruction incident to typhoid perforative peritonitis. The perforation, however, could not be demonstrated at operation. The intestines were greatly distended, and they were drained by an enterostomy and by a trochar at two other points. Cigarette-drains were introduced. The symptoms were ameliorated, and, for a day or two, there seemed to be some hope, but high temperature and an extending peritonitis soon dispelled this, and the patient died on the third day.

Case 2, one of gangrenous appendicitis and beginning peritonitis, was operated on on the second day of the illness, and developed obstruction from a general peritonitis, necessitating my recall in forty-eight hours. Three enterostomies were done, and the bowel was irrigated and closed by purse-string sutures of catgut in the absence of silk or linen. The third opening was closed about a No. 14 English catheter, which was

used for continuous drainage. The sitting position, proctoclysis, ice to the abdomen, nothing by mouth, hypodermoclysis, and hypodermic medication were continued, and her life was prolonged a week. Bowel movements had been secured, and the distension had subsided. Death was apparently due to a leak from one of the enterostomy wounds closed by catgut, as there had been sudden pain after peristalsis, followed by shock and collapse.

Case 3, a desperately ill and complicated case from appendix peritonitis, a successful case last year, No. 2 of that series, was fatal this year because of infection following premature delivery complicated by obstruction from adhesions. Life was prolonged, but the patient succumbed to general infection and toxemia.

Case 4, a very obese man of fifty-two, ate two Thanksgiving dinners and was attacked by severe abdominal pain and vomiting at 2 A. M. He was seen by a medical man, and a hypodermic of morphine was given. He was seen by me at 10 A. M. He was fairly comfortable, though the abdomen was tense, and there was a sense of discomfort at the left of the umbilicus. The pain had been so persistent from the start that obstruction was suspected. Cathartics had therefore been withheld, and proctoclysis instituted. There had been no results on the following day, and there were more distension and some vomiting. Operation was recommended and accepted, but several hours' delay was necessitated by a wait for relatives.

The abdomen was opened at 4 P. M., thirty-eight hours from the onset of the illness. There was present in the muscles the most intense rigidity ever encountered by me in an operation. The extraordinary abdominal fatness was also a handicap in exploration. The ileum presenting was contracted and empty, but began to dilate and fill after a few minutes' exposure. The hand encountered no distinctly dilated gut in any

part of the abdomen, though sought with considerable persistence. Lead ileus was suspected, and the anesthetizer was asked to examine the gums. His report was negative. Dynamic or spasmodic ileus from toxemia was considered the most probable cause of the condition. Inasmuch as the intestine had filled, an enterostomy was done, and the gut was washed by means of an irrigating tube, and the incision in the gut was closed with three purse-string sutures about a large-sized catheter with its tip cut off. The gut was anchored to the peritoneum, and the abdominal wound was closed with great difficulty. Drainage from the bowel was never more than a few ounces. The patient rallied well, but eventually sank and died about thirty hours after operation. A post-mortem revealed a distended bowel above the tube, which, for some cause, had not drained properly. No cause for the obstruction was demonstrable. The case would undoubtedly have had a better prospect had better bowel drainage been secured.

This leads us to the consideration of the technic of enterostomy. The method preferred by me is represented by the principle described under an E. J. Senn gastrostomy. This is somewhat preferable to the Kahder technic. It is simpler, easier of execution, and probably more reliable. I usually prefer to introduce the three fine linen sutures first and to introduce the catheter through a stab-hole into the gut. By introducing the sutures first, we are less likely to include too great an amount of the circumference of the gut than by introducing them after the caliber is reduced by collapse after emptying. Unless a very large catheter is used, No. 14 to No. 16, English scale, undigested particles may occlude the tube, especially when it is introduced high in the small intestine, and the same trouble may arise when it is introduced into the colon because of fecal masses.

The writer suggests that in operations for resection of the large bowel, especially in its distal half, where successful suture is difficult of attainment, as is evidenced by the imperfect results in that portion of the gut, as compared with suture of the cecal end, that a vent-tube be left in the bowel, on the above-described principle, to prevent the distension and ballooning from gas which so commonly results and which is so destructive of results in suture of this part of the intestinal tube.

I am disinclined to believe that the fecal masses interfere appreciably. The gas distension, however, prevents rest to the part, and produces an amount of tension and strain too great for the thin, parchment-like structure of the distal half of the colon. Dilatation of the anal sphincters and the retention of the rectal tube would also be good practice in these cases, in my judgment.

The writer is also disposed to believe that an enterostomy-tube left in any portion of the bowel, as a vent or safety-valve, would contribute towards safety in a class of cases in which for any reason results from suture are doubtful; and that the complete rest of the bowel by drainage of gas and feces would contribute to safety, and the patient's fate would not be so absolutely dependent upon faultless work and strictly favorable conditions, both in the operation itself and the condition within and without the bowel. The tube may be introduced into the bowel at the line of suture or at a point which may be most convenient and practicable, proximal to the sutured portion. After the removal of the tube at any time there should be little or no leakage. Leakage has never given trouble in my experience. Repeated reintroductions have been practiced for irrigations in colitis cases, and in the cases of enterostomy with recurrent symptoms, for relief from gas, without any unpleasant experiences.

The reporting of these fatal cases seemed necessary lest too great optimism result from the reported successes of last year. The fatal series were operated on as a last resort with little or no hope of success because of their unfavorable character. By operating on cases of this class, some are occasionally saved that would die without this intervention.

SOME OBSERVATIONS CONCERNING INTES- TINAL SUTURE

ARTHUR E. BENJAMIN, M. D.

MINNEAPOLIS, MINNESOTA

I present this subject with the desire to stimulate more efforts along experimental lines in gastro-intestinal surgery, to offer a few views of my own upon certain special features of this work, and to get an expression from members of this Association, in the hope that we may arrive at a point where we may get even better results than we do at the present time in our work upon the stomach and the intestines.

Ever since it was found that the abdomen could be safely invaded to attack disease there has been much effort put forth to perfect a simple, safe, and satisfactory method of intestinal anastomosis. Surgeons, after working for years experimentally and by actual practice with bone plates, bobbins, cylinders of magnesia, the Murphy button, special instruments, etc., have come to the conclusion that the suture method is the most satisfactory. Many of these appliances were used by their originators with ease and dexterity. Most of them have been discarded by the skilled surgeon of today. The bowel-clamps for holding back the bowel-contents and to steady the viscus while the work is being done, are about all that are now resorted to by such operators.

The purpose of the sutures should be to prevent leakage, pursing, or hemorrhage, and to hold the

bowels in apposition until healthy union has occurred; and when such union has taken place they should be absorbed or passed off into the lumen of the gut. When non-absorbable sutures are used they are exposed to the encroachment of the omentum or loops of bowel, and numerous adhesions may occur, especially if there is any infection.

There has been much controversy over the method and manner of uniting two loops of intestines. It would seem, however, that few men now would select any but a side anastomosis where that one is possible, as the blood-supply is much better, the anastomosis is more secure and, accurate, and it gives a greater percentage of recovers.

Silk has been used for bowel anastomosis more than any other material, but linen and Pagenstecher thread have of late been greatly favored. The latter is much easier to handle, and does not easily knot.

Since we are now able to produce a sterile catgut suture, one which will last a sufficient length of time for union of the intestine to take place, it is steadily gaining ground; yet few operators are willing to trust to its use entirely in making an anastomosis. In several experimental operations upon the lower animals, the author has from time to time demonstrated its advantage and security. In fact the use of chromic catgut for both lines of suture, has been followed by perfect results in every instance when carefully applied and securely locked. With its use for the outer suture line and Pagenstecher for the inner suture absolute security is obtained when properly introduced.

The rule of applying the catgut suture, instead of linen or silk, to the serous surfaces, I believe should be considered also in relation to appendiceal surgery. It frequently happens that where non-absorbable sutures are used for the appendix, they cause great distress, many adhesions, lessened bowel activ-

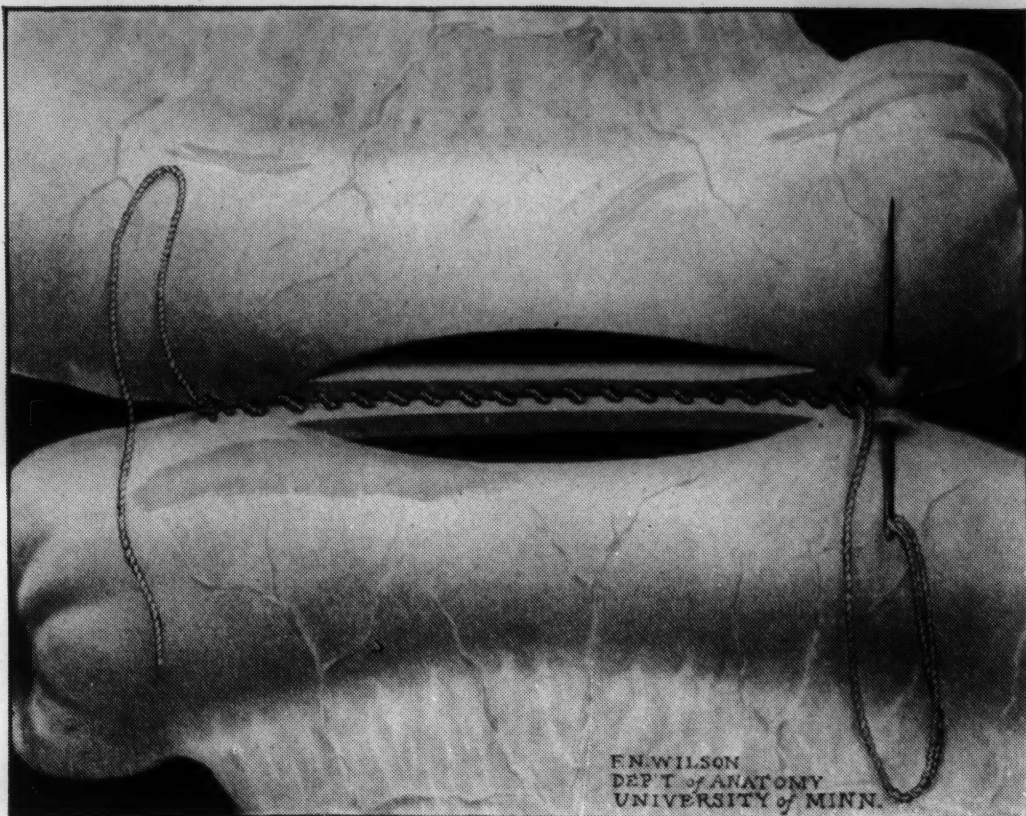


Fig. 1

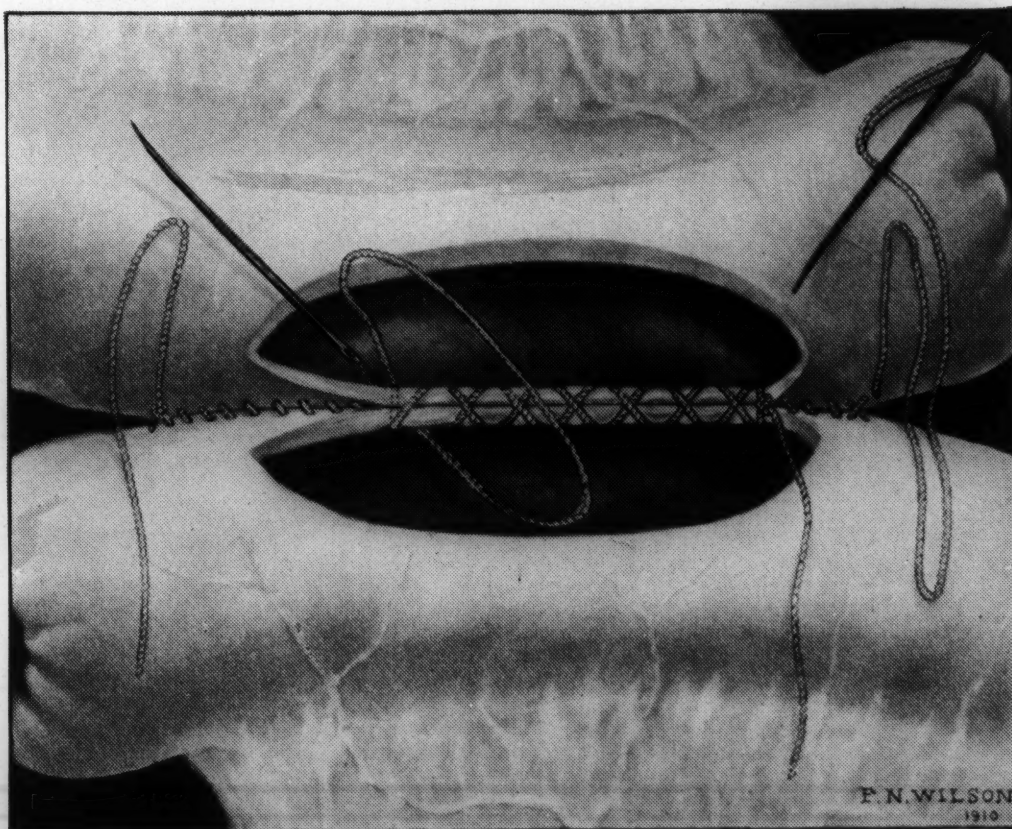


Fig. 2

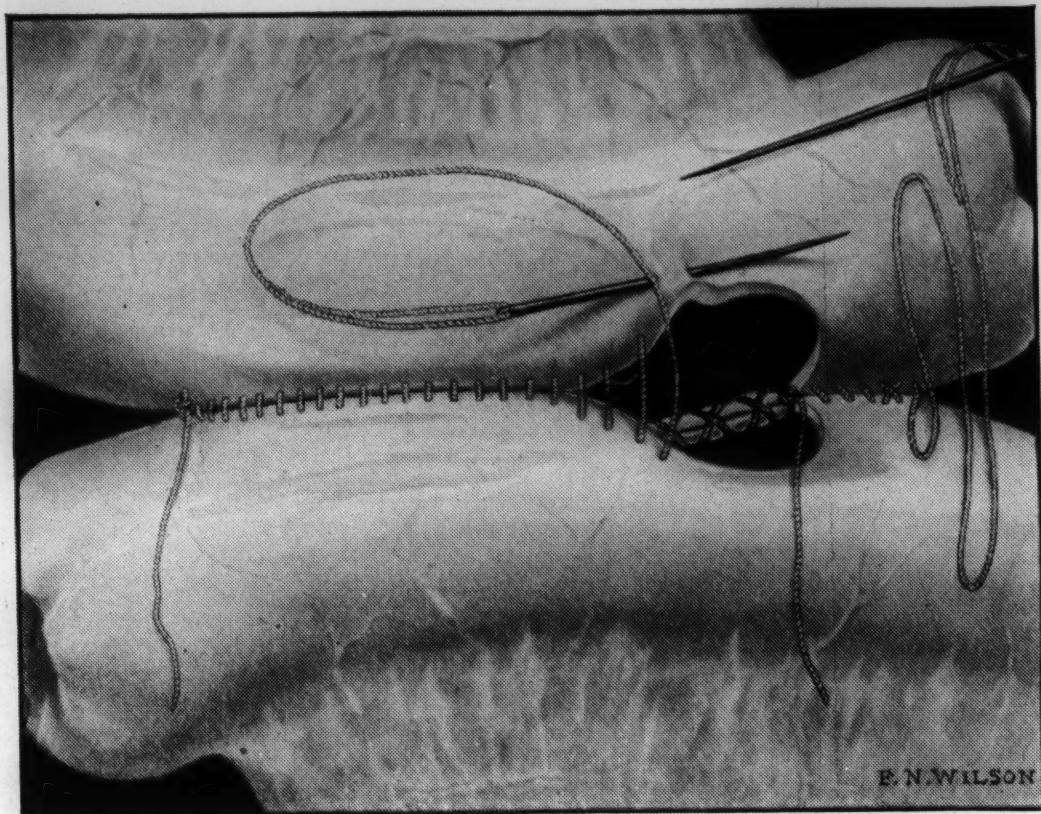


Fig. 3.

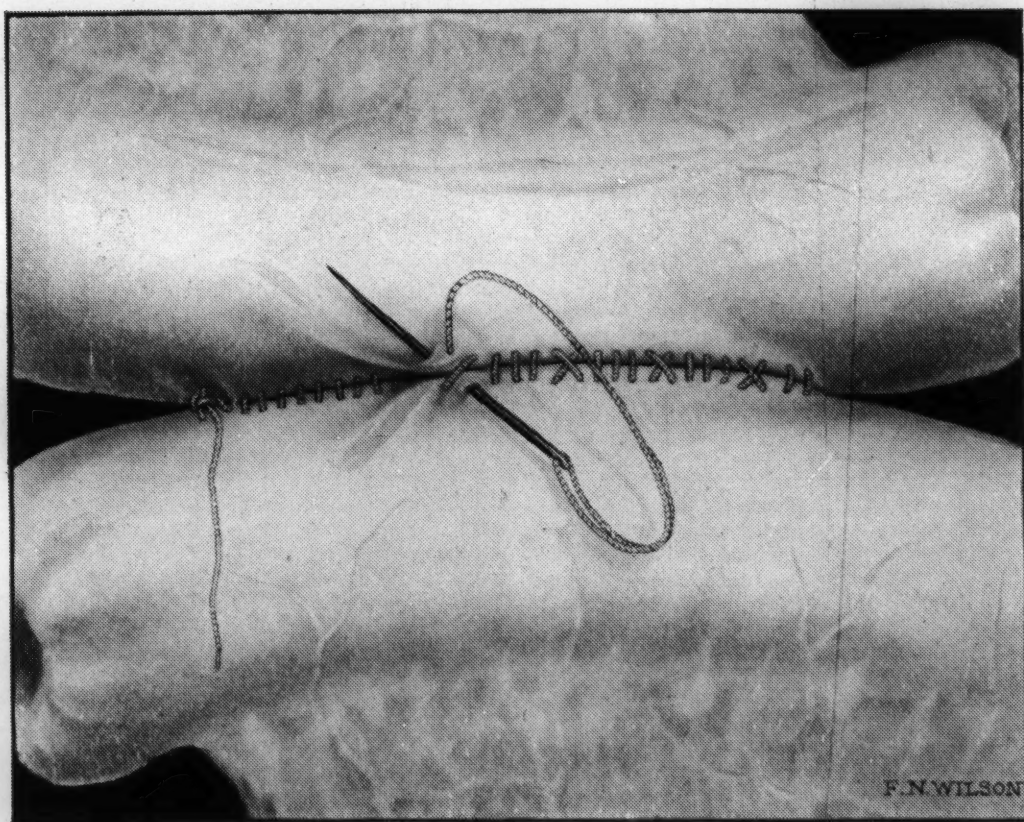


Fig. 4.

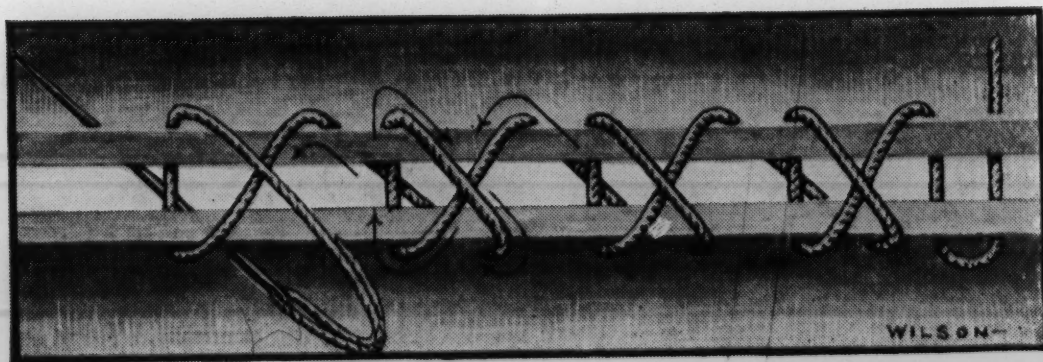


Fig. 5

ity, and obstruction or abscesses, necessitating further surgical work. In other words, the foreign substance acts as a constant irritant, against which the tissues rebel, causing no end of trouble at times.

I use chromic catgut for appendiceal work, to turn in gastric ulcers, and to repair small fecal fistulæ. In most cases of gastro-enterostomies or bowel resections, the Pagenstecher has been used within, and the chromic catgut without, with satisfactory results.

Inasmuch as the ideal result of an intestinal anastomosis is secured when there is an ultimate expulsion of the sutures into the viscus, a method which facilitates the early accomplishment of such a result consistent with safety, is to be favored. The nearer the sutures line to the lumen of the bowel the more likely does this early sloughing take place. Less tissue from the bowel is destroyed, and less unnecessary exudate occurs when the non-absorbable or sloughing suture line is superficially placed.

A suture introduced in the most rapid manner possible consistent with the utmost security against leakage, hemorrhage, or infection; the approximation of like structures; and the maintenance of the properly-sized opening, are extremely desirable. The over-and-over stitch is quickly introduced and gives a good appearance to the bowel, but is liable to produce pursing. It may cut out and loosen up the whole line in case of early bowel tension, causing leakage and infection.

The cobbler's stitch makes a very secure and safe anastomosis. It does not allow any leakage of gas or bowel-contents. It can be tied at short intervals, making slipping impossible. On the other hand it is a slower process of suturing. A third assistant is usually required to do fairly rapid work. It is a very satisfactory inner stitch. Uniting the mucous membrane by a through-and-through stitch of Pagenstecher makes the operation safe. It controls hemorrhage per-

fectly and sloughs out in the course of two weeks into the bowel. It can be quickly enclosed by an over-and-over Lembert stitch of chromatic catgut.

An over-and-over Cushing's suture purses, and if it pulls out the suture line may open up somewhat and permit the escape of infectious material. It is not as quickly introduced as the over-and-over, nor is it as secure. It is very useful, however, in turning in the mucous membrane of the upper inner suture line. If a lock-stitch is used in connection with this suture the anastomosis is more secure and perfect.

The interrupted suture is too slow a process, and is not more secure or perfect than other suture lines. Connell's suture when an end anastomosis is made, is very satisfactory.

Lembert's suture continuous or the Halstead-Lembert is the only stitch used with satisfaction in approximating the serosa. It can be locked if desired by a backward stitch passing through the tissues, which does not allow puckering or slipping.

A backward lock-stitch consists in making an over-stitch with a backward stitch between the last sutures, through the bowel coats, locking each and coming out on the opposite side a little in front of the last forward stitch. It certainly makes a flawless stitch, allowing no leakage or separation of tissue, and when this is used for the inner suture line of Pagenstecher thread it will slough into the intestine in about two weeks.

The inner suture line is the important one for the reason that it is completed first and determines the size of the openings between the loops of intestine. It also is the one which controls hemorrhage, or may not permit temporary leakage and infection of the other suture line. This suture should be a through-and-through stitch, properly placed, not permitting of pursing, leakage, or hemorrhage. The backward lock-



Fig. 6. Introduction of first or outside row of chromic catgut sutures.



Fig. 7. Inner suture of Pagenstecher thread, continuous through-and-through stitch.

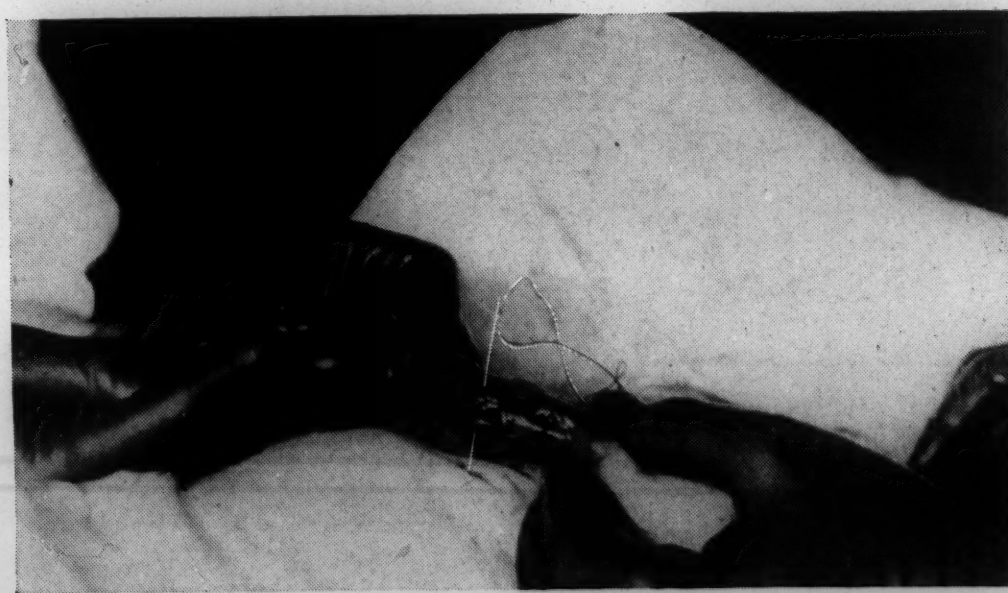


Fig. 8. Completion of outside catgut suture. (Lembert.)

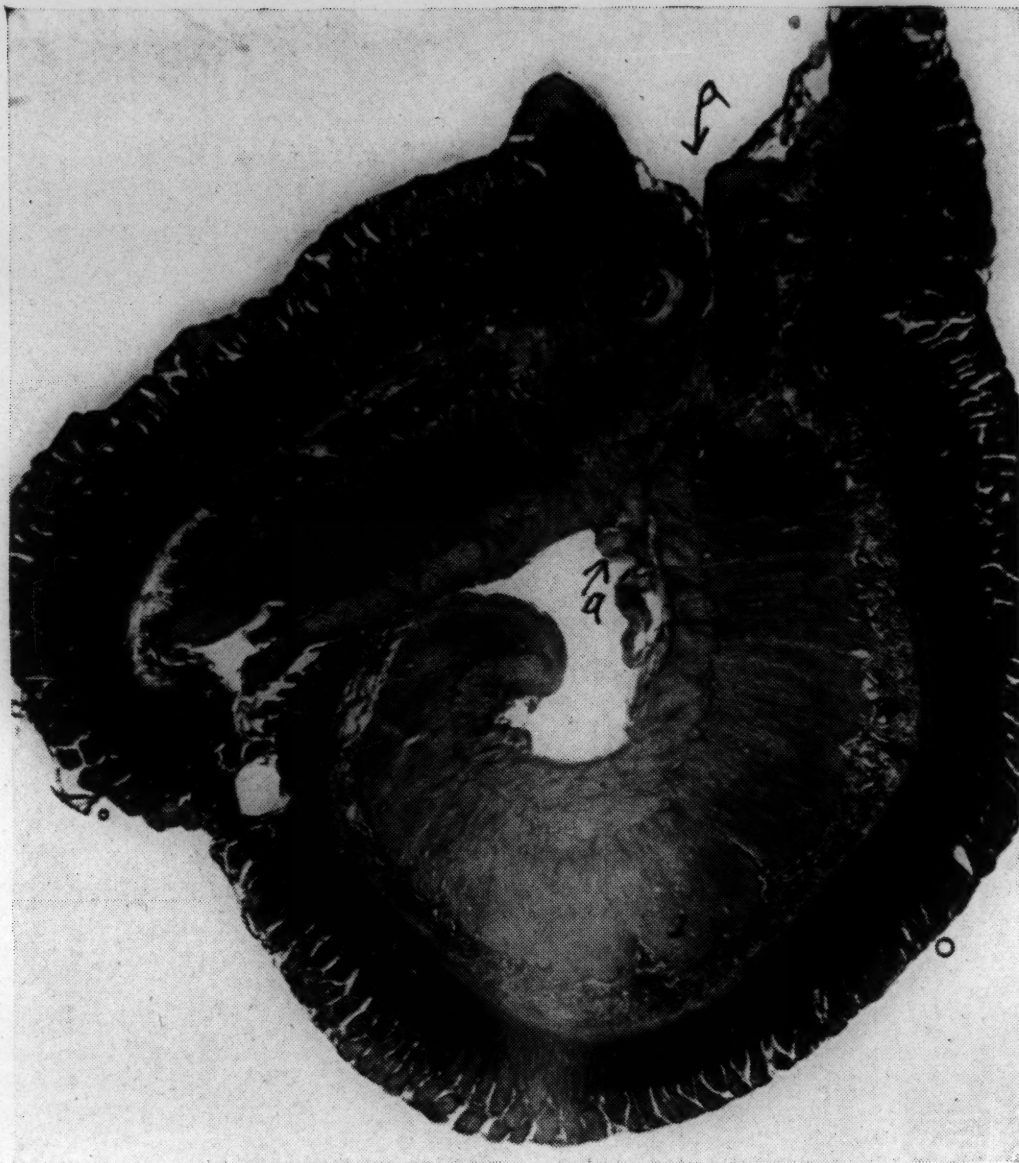


Fig. 9. The arrows a, a, show line of union. Chromic catgut No. 1. for outside suture (cobbler's stitch); Pagenstecher's for inside continuous lock-stitch. Twenty days between two operations.



Fig. 10. The arrows a, a, show line of union. Cobbler's stitch of chromic catgut No. 1 outside; lock-stitch of same inside. Ten days had elapsed between the first and second operations. X, location of suture.

stitch meets these indications, and when surrounded by a chromic catgut Lembert suture an ideal result may be expected.

This stitch is absorbed and the inner Pagenstecher stitch in due time sloughs into the bowel, leaving no foreign substance to interfere with the bowel action to promote adhesions.

The success of gastro-intestinal operations depends upon—

1. General condition of the patient.
2. Preparation of the patient.
3. Condition of the alimentary canal.
4. Kind and manner of anastomosis.
5. Rapidity and dexterity.
6. Accuracy and care of stitching.
7. Suture material.
8. Number of rows of sutures.
9. Manner of placing the respective rows of material.
10. Surgical cleanliness observed.
11. Character of growth removed.
12. Amount of tissue and part removed.
13. Healthfulness of tissue left.
14. After-treatment.

The condition of the alimentary canal at the time of the operation determines in a measure the degree of success of our gastric and intestinal operations.

A patient thoroughly prepared for such an operation by limiting the diet to sterile liquids for two or three days previous, the use of sterile cups, a thorough cleansing of the stomach by washing, and the elimination of the waste products of the alimentary canal, is well fortified against any serious complication of an operation, by the distention due to the presence of gas and infectious microorganisms within the canal.

The tension or stress put on the sutures and the

tissue making up the anastomosis, is limited indeed where the above precautions are observed.

TECHNIQUE OF THE OPERATION OF INTESTINAL RESEC-

TION, AS SELECTED FOR ITS RAPIDITY, SECURITY,
EASE, AND ACCURACY FROM EXPERIMENTS
AND BY ACTUAL PRACTICE

The loops of the intestines desired are brought up through the abdominal wound, and the part to be resected is examined. The abdominal opening is carefully surrounded with wet gauze, the bowels stripped, pushing all bowel-contents back to a safe distance, and the bowel-clamps are placed upon these loops a sufficient distance either way to allow enough bowel tissue to be used for the anastomosis. (In case of a gastro-enterostomy the rubber long clamps are placed on the stomach for the same purpose.)

The mesenteric vessels are now ligated with chromic catgut No. 2, Van Horn's 20-day near the bowel supplying the portion to be resected. A chromic catgut ligature is now tied securely around the bowel, at each end at a safe distance from the diseased portion. A purse-string chromic catgut is introduced three-quarters of inch below this suture.

Clamps are placed on the end of the diseased bowel one-half inch within the ligatures, other clamps steady the bowel near the constricting suture, and the bowel is severed between and the exposed mucous membrane carbolyzed. A blunt pointed artery forceps inserts the stumps, and the purse-string sutures are tied. The loops are now brought along side. Two short right-angled round-pointed tenaculum forceps are placed at either end of the selected points for the anastomotic opening and held one by an assistant, the other by the operator's left hand. The loops are put on a moderate stretch, a catgut suture No. 1, 20-day chromic on a proper-sized round needle is now introduced at the

assistant's end of the anastomosis, and the backward-lock-suture is rapidly introduced, locking at short intervals, the needle being grasped by a forceps in the hand of the assistant each time. This suture is continued along the bowel surfaces near the mesentery border for about three inches. The bowel loops are, during the procedure, also supported by gauze pads held in the hands securing the loops as in Photograph A.

The loops, well surrounded with moist gauze pads, are now opened close to the suture line with a sharp knife and enlarged by a sharp straight scissors until the opening is made in either loop about two inches or more in length. The bowel is gently stroked from either way towards the anastomotic opening, and the field well cleared. Hot compresses lessen the bleeding somewhat. The tenaculum forceps is now placed at the ends of the cut edges, nearest the stitch-line and held as before, gauze pads assisting in the support.

Pagenstecher thread is introduced first at the operator's end, and a continuous back lock-stitch is quickly introduced, passing through all the coats near the cut lines. (See photograph B.) It is continued around the anastomotic opening, and the angles all safely secured by a deeper hold of the tissues. When the opposite side of the through-and-through stitch-line is reached, the tension forceps is transferred to this line with the operator's thumb and index finger, with sponges closely approximating the edges, the suture is so placed as to turn the mucous membrane in by the lock-stitch, Cushing's suture, the suture line appearing on the inner surfaces of the bowel as Connell does with his interrupted suture. When the other angle of the opening is reached it is carefully sutured with a few supplementary sutures and tied to the end left.

The needle threaded with the chromic catgut by which the first line of approximation was made, is

now picked up, and the Lembert stitch is continued around the rest of the anastomotic opening enclosing the inner or Pagenstecher suture-line. The loops of intestines are held by a sponge in the assistant's and operator's hands from their respective sides. (See Photograph C.) The angles are especially well secured and locked, and the suture is tied to the long end left at the beginning of the sewing.

A secure and firm suture-line is observed to be made. The parts are carefully sponged and cleaned up, the bowel clamps are removed, and the loops placed within the abdomen. If any possible weak or doubtful point remains, the omentum may be stitched here with plain or chromic catgut.

AFTER-TREATMENT

The after-treatment of these cases, I believe to be very important. No food should be allowed for a couple of days. The more sterile the food is, when given, the less likelihood is there for fermentation, distention, or infection, which may weaken the suture-line. Solid food causes more pressure upon the structures, there being more residue.

A sufficient time should be allowed after an operation for Nature to throw out the plastic exudate, which closes all chance of escape of infections, (microorganisms) before the bowel should be called upon to perform the function of propelling fecal contents onward.

The distention of the bowel is apt to produce tissue-destruction by the sutures strangulating the tissues, or cutting out of the sutures, which loosens their hold upon the structures and causes leakage and possible infection. If there are any solid contents passing through the anastomotic opening the sutures of the inner layer may be dragged out too soon.

CONCLUSIONS

1. Instruments or buttons for making an intestinal



Fig. 11. X shows where suture passed. Chromic catgut continuous suture, occasional lock, outside; Pagenstecher thread, through-and-through lock-stitch inside. Twenty-six days from first operation.



Fig. 12. X shows opening in spec. of anastomosis. Twenty-seven days from operation.

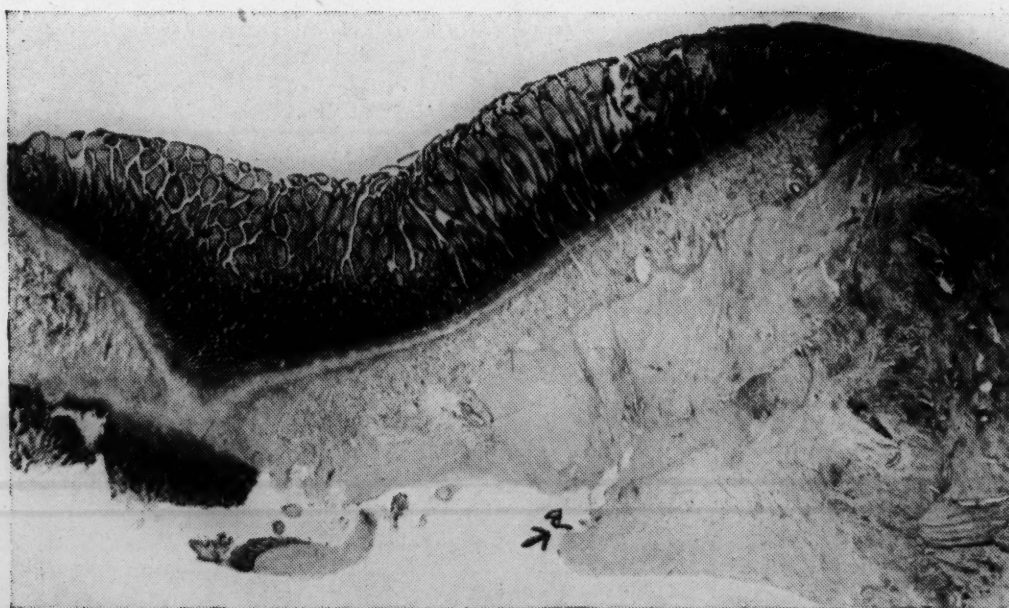


Fig. 13. Direction of arrows marked a, a, indicates line of union. Chromic No. 0 catgut outside; Pagenstecher thread, back lock-stitch inside. Nine days from last operation.

anastomosis, have practically been discarded for the suture, as there is less loss of tissue thereby.

2. The purpose of these instruments in the past was to facilitate the making an anastomosis and to render the operation more safe.

3. The sutures are to prevent hemorrhage and to approximate like structure until a firm union has taken place, after which they should be absorbed or passed off into the intestines.

4. The side anastomosis is chosen because of the positive blood-supply, its safety, and ease of performance.

5. The preparation of the patient by carefully selecting the diet, proper attention to waste-product elimination, stomach-washings, etc., goes a long way towards bringing success in these operations.

6. Pagenstecher's thread is largely used for the outside sutures in bowel work. Being a foreign substance it may provoke unnecessary adhesions, calling for further operative procedures.

7. The linen thread can be used with safety for the inner line of suture, and when properly placed prevents hemorrhage or leakage, and is soon eliminated.

8. This inner suture should be so placed as to prevent pursing or narrowing of the anastomotic opening. Through-and-through back-lock stitch is very suitable for this purpose.

9. The chromic catgut makes an admirable suture for the outer layer, and when used as a continuous Lembert, outside of the Pagenstecher lock-stitch, a safe and satisfactory union occurs.

10. Care should be observed in performing operations to avoid contamination.

11. The after-treatment of the case is very important. Food should not be given too early, so as to avoid undue tension upon the suture-line.

RECENT ADVANCES IN THE TREATMENT OF NEPHROLITHIASIS

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The marked improvement in the operative treatment of renal and ureteral calculi is to be ascribed, in no small measure, to the general employment of more refined methods of diagnosis. The divisions of the main subject of renal calculi, in which the writer has been particularly interested during the past few years, are (1) the value of radiography in the diagnosis of renal calculi; (2) the frequency of occurrence of bilateral calculi and their relation to calculous anuria; (3) the importance of the newer work in the surgical anatomy of the kidney; and (4) the choice of operation for removal of renal calculus, i. e., pyelotomy or nephrotomy.

1. *Value of radiography.* A few years ago one would be inclined to consider Kümmell's dictum, "no shadow, no stone," as too radical. The percentage of positive results (i. e., shadow present and calculus found at operation) is so large at the present time that such a statement does not seem an exaggerated one. The only exceptions to such an apparently dogmatic statement are the pure uric acid stones which give either very faint or no shadows.

In order to obtain such a large percentage of positive results, certain conditions are essential.

First. The radiograph must be taken by one who

has had a large experience in this special field. Radiography of the urinary organs has made rapid strides since the introduction of the Albers Schönberg compression apparatus. Although equally good pictures are obtained by some very expert radiographers without such an apparatus, still far more uniformly accurate pictures have been secured through its more general employment. It is beyond the scope of this article to discuss the technic of taking such pictures further than to state that we employ the compression apparatus in all of our work.

Second. Both kidneys and both ureters should be included in every picture. It is our routine practice at the Michael Reese Hospital to take a first picture covering both kidneys and the upper portion of each ureter, and a second picture, which includes both lower ureters and the bladder. The importance of such a bilateral exposure is referred to later.

In a good picture one can distinctly see the position, the outline, and the number of calculi. When the kidney is in its normal position, the stone shadows lie between the eleventh rib and a line drawn through the transverse process of the first lumbar vertebra. In a kidney which lies lower than normal the shadows will be found in a corresponding relation to such a dystopic position.

A kidney radiograph is best examined when dry and placed in a "diagnostic box." The use of an opera glass or powerful lens will be found of great service. A long twelfth rib (Fig. 2) may hide a stone shadow unless the plate is carefully studied. A calculus lying at the outlet of the renal pelvis usually has a nipple-like projection, which is so characteristic that when seen opposite the transverse process of the first or second lumbar vertebra one can readily remove it

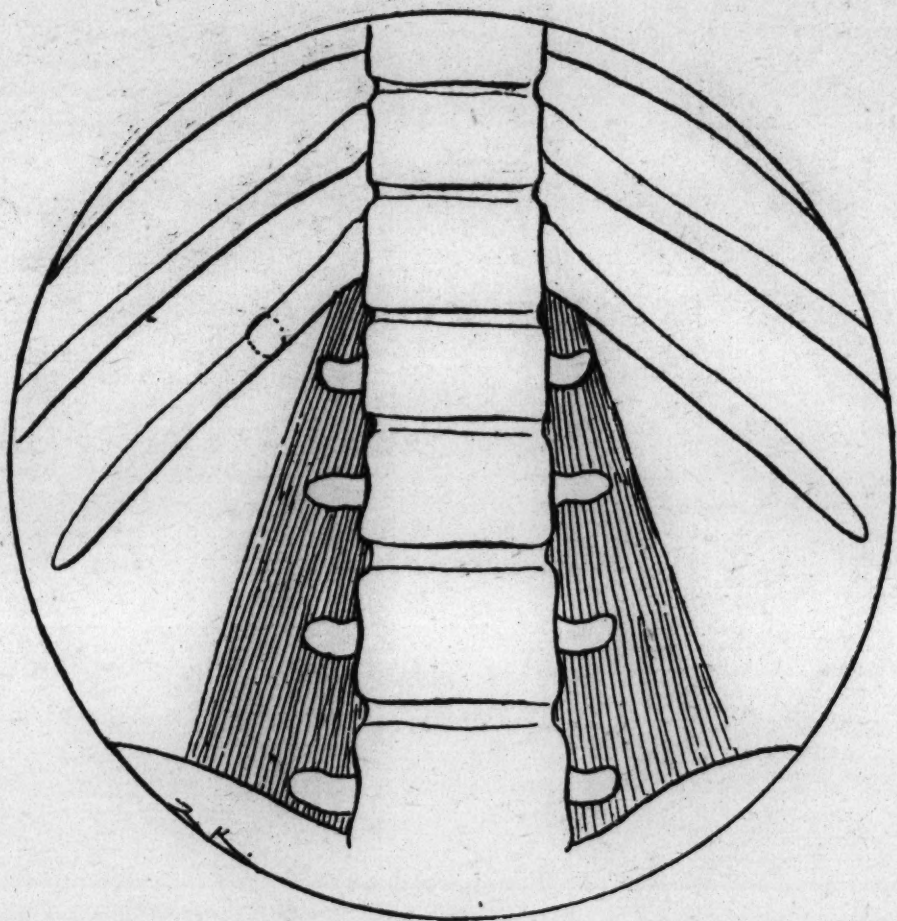


Fig. 1. Diagrammatic view of the area to be covered by a skiagraph of both kidneys and the upper portion of the ureters. The circle behind the twelfth rib shows the shadow of a calculus lying in front of this rib.

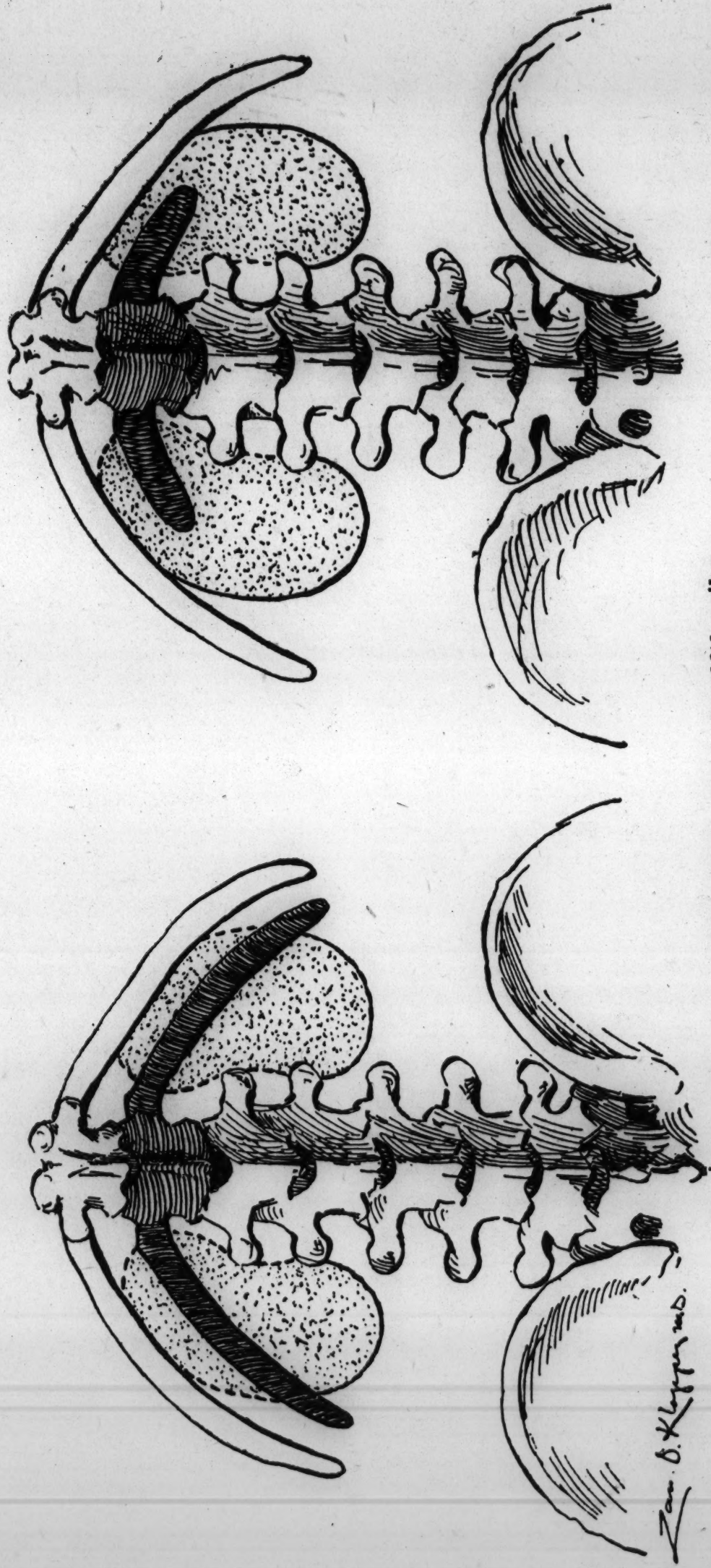


Fig. 2. Long and short twelfth ribs.

through an incision into the pelvis, provided no other stone shadows are present.

Stones in the parenchyma usually have small, round, or oval shadows. When calculi lie in dilated calyces or in hydro- or pyo-nephrotic cavities, the shadows are quite large and oval. When the shadow is triangular or branched, one can diagnose a large calculus occupying a greatly dilated pelvis. If a number of widely scattered shadows are seen, extensive destruction of the kidney has usually taken place. The majority of calculi belong to the mixed types and cast shadows of equal intensity, sufficiently deep to be readily detected.

Third. The patient should be thoroughly purged and kept upon a diet of tea and broth for eighteen hours prior to the taking of a kidney or ureteral picture. In this manner one can exclude shadows due to scybala or other foreign matter in the bowels. In addition to the latter, one must differentiate shadows due to kidney calculi from those cast by calcified retroperitoneal and mesenteric glands, centers of ossification in the costal cartilages, and caseous tuberculous foci in the kidney. These can be excluded by one experienced in the interpretation of such radiographs.

2. *Bilateral Calculi.* Unfortunately, but few statistics exist which are of value in determining the relative frequency of the simultaneous presence of calculi in both kidneys or both ureters. That such a condition occurs far more often than was formerly believed is shown by the fact that in a recent paper by Kümmell, of Hamburg, reporting 101 cases of renal calculi, they were present on both sides of sixteen patients, i. e., nearly sixteen per cent. In his "Renal Surgery," published in 1901, Israel states that renal calculi occur upon both sides in twenty-seven per cent of his cases. I have been unable to find any more recent statement of Israel's experience in this direction. Kapsammer

found bilateral calculi in five out of a total of twenty-eight cases of nephrolithiasis operated upon in von Frisch's clinic. He also found that in 73 cases of nephrolithiasis, examined during autopsies in the Pathological Institute of the General Hospital at Vienna, the calculi occurred in both kidneys in twenty-two cases, i. e., thirty per cent. The latter figure corresponds with the estimate of Watson, based upon 231 cases of renal calculi, reported by Legueu, Albarran, Israel, Morris, and Kümmell. Watson found that the number of cases in which the calculi existed bilaterally, was thirty per cent. I have been able to collect twenty-six cases from recent literature. To this number can be added three occurring in the Michael Reese Hospital during the past year, in patients of Dr. L. L. McArthur, Dr. Braunwarth, and the writer, making a total of twenty-nine cases (Fig. 13).

Reference has been made in the section of *x*-rays technic to the necessity of including both kidneys in the radiograph. In many of these cases of bilateral calculi the pain is either constantly unilateral or shifts from one side to the other in a most confusing manner.

It is not only in order to avoid the reproach from the patient of having neglected to examine both kidneys for calculi that the surgeon must be informed as to the unilateral or bilateral presence of the calculi, but the danger of sudden anuria is far greater in bilateral than in unilateral nephrolithiasis.

Anuria occurred in six of Kümmell's fourteen cases, and four of these died, showing the gravity of the prognosis in bilateral cases. One of Watson's cases died of anuria, and in one of Cabot's two cases anuria appeared upon the eighteenth day of the first nephrotomy. Such an anuria is usually due either to the sudden bilateral closure of both ureters or to the

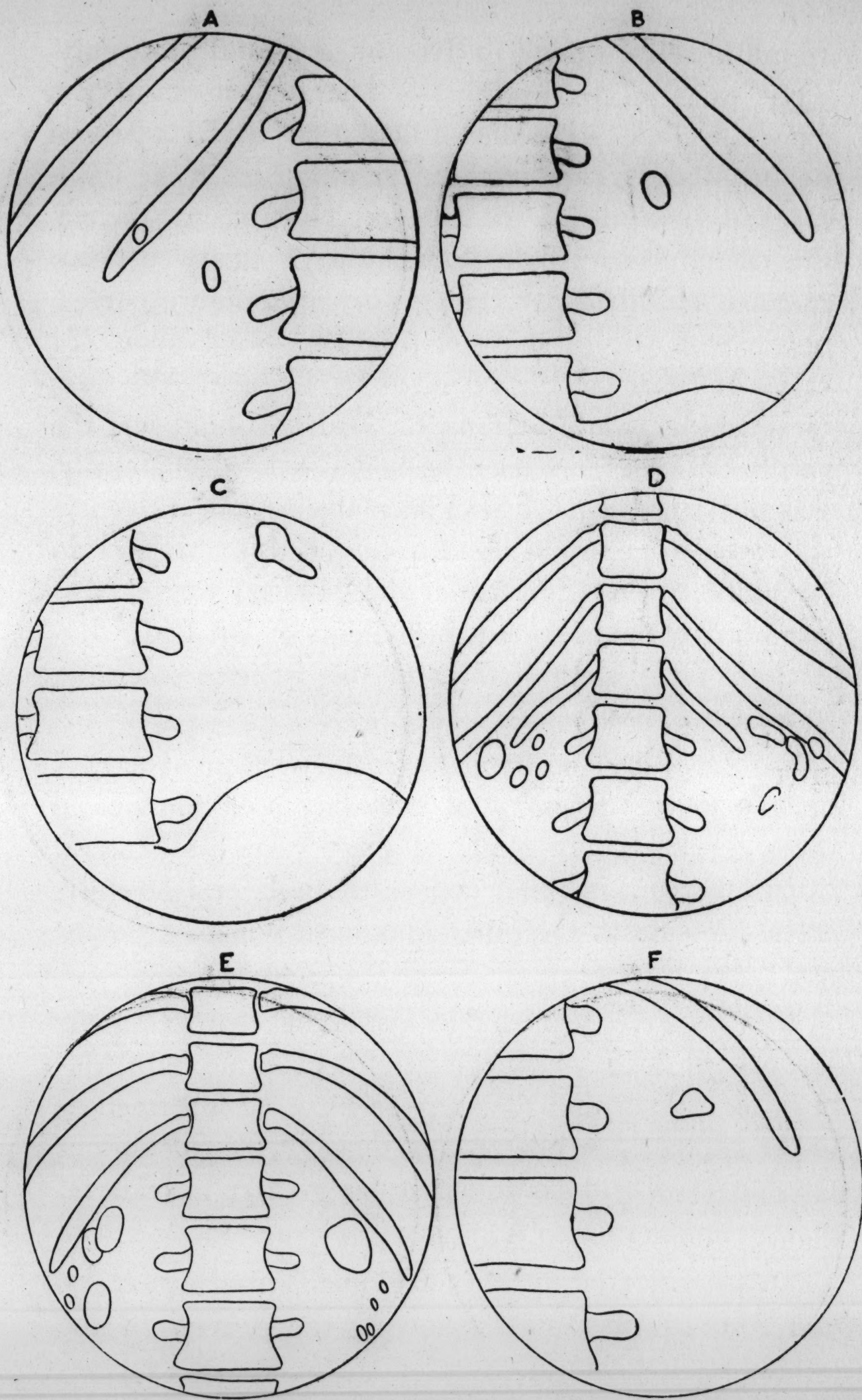


Fig. 3

Figs. 3 and 4. Tracings of renal skiagraphs.
 A, calculus shadow at outlet of pelvis and a second lying behind the twelfth rib. B and C, calculi lying at outlet of pelvis.
 D and E, bilateral calculi. F, nipple-like projection of calculus lying at pelvic outlet.

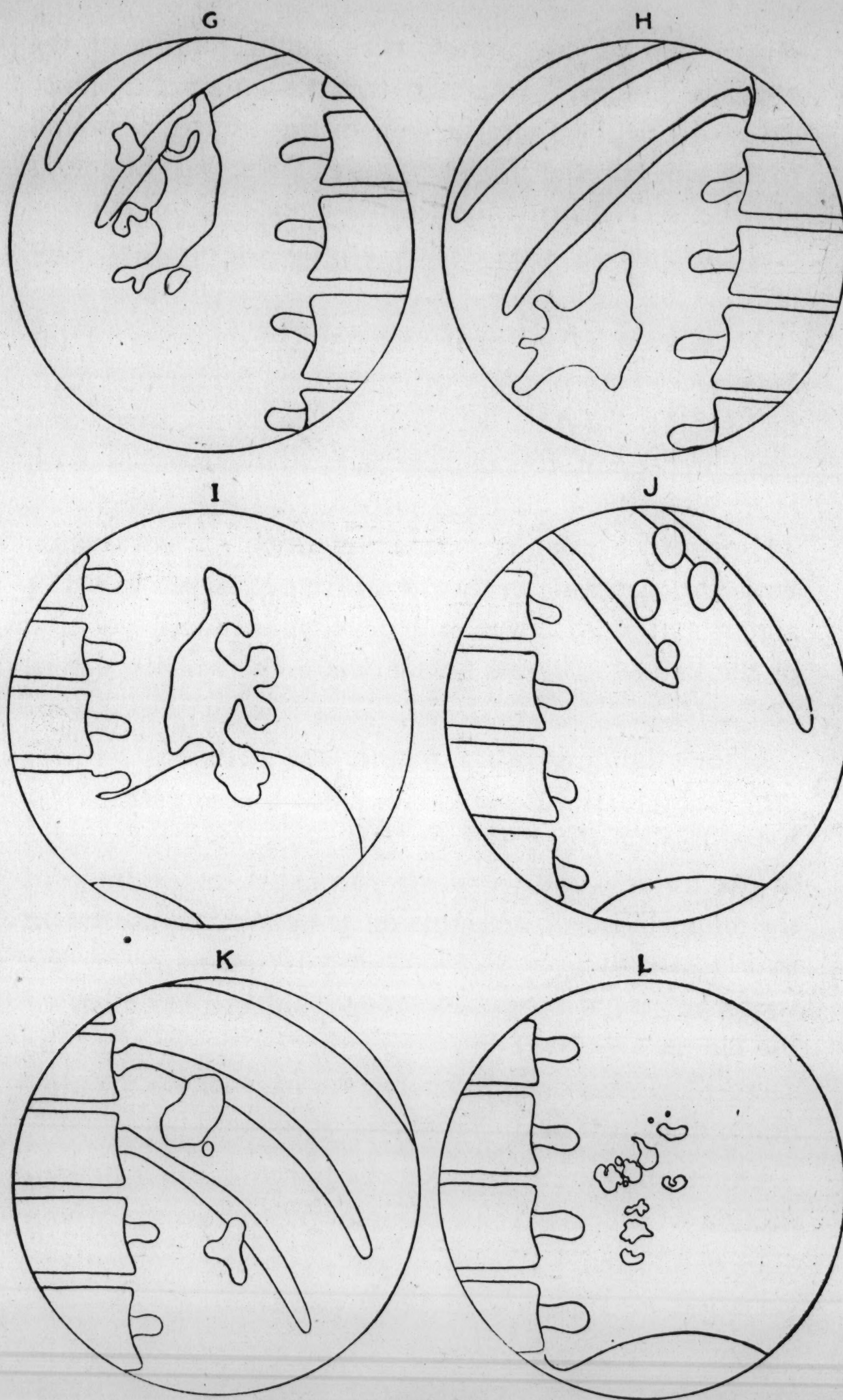


Fig. 4

G and H, coral-like calculi filling entire pelvis of kidney.
I, coral-like calculus lying in dystocic kidney (just above crest of ileum).

J, K and L, multiple calculi lying in pyonephrotic kidneys.

I am indebted to Drs. Greensfelder, Braunwarth, Reichman, McArthur, and Kahlke for permission, to reproduce several of the tracings.

obstruction of one ureter, with reflex anuria of the opposite kidney. It is the writer's belief that more cases of calculous anuria will, in the future, be found to be due to the former cause (bilateral calculous obstruction) than to the second-named cause (unilateral obstruction with reflex anuria of opposite kidney).

3. *Recent advances in the surgical anatomy of the kidney.* As the number of operations performed upon the urinary organs increases, it becomes more and more important for the surgeon to be familiar with every new detail in the anatomy of these structures. Those which require special mention in connection with the surgical treatment of renal calculi are (1) abnormalities of form and development and position of the kidney; (2) abnormalities of the vessels, pelvis, and ureters.

Under the head of the former are included (*a*) solitary kidney, i. e., only one kidney is present; (*b*) horseshoe or fused kidney; (*c*) lack of development of one kidney, or hypoplasia (an excellent example of the importance of recognizing a hypoplasia is shown in Fig. 3, and was described in a recent paper by the writer); (*d*) dystopia, or congenital displacement of the kidney. Such organs are either at the level of the sacro-iliac joint or in the pelvis. Fig. 4 shows a radiograph of calculi in such a dystopic kidney.

Other anatomical points to be borne in mind in connection with operative work upon the kidney are anomalies of the renal arteries, i. e., accessory arteries and variation in the types of renal pelves.

Accessory renal arteries. The importance of the knowledge of the existence of more than one renal artery arising from the aorta cannot be overestimated. In compressing the pedicle of the kidney to check hemorrhage during a nephrotomy for the removal of renal

calculi or in ligating the pedicle during a nephrectomy, one can easily overlook an accessory artery. Bleeding from such a vessel may prove very annoying during a nephrotomy, or it may be torn off and a serious, if not fatal, post-operative hemorrhage result. After ligating the main renal vessels during nephrectomy, ignorance of the presence of accessory arteries may cause in a similar manner serious hemorrhage.

Practically no reference is made to this important anatomical point in books on anatomy or surgery, although Israel and some other writers mention cases of almost fatal post-operative hemorrhage from this cause. The statement in the majority of books on anatomy is that a single renal artery arises from each side of the aorta to supply the corresponding kidney, dividing at or within the hilum into several branches. (Fig. 5.)

My associate, Dr. D. C. Strauss, and I have recently begun the observation of the frequency of such anomalies in a large number of cadavers, but the work is not sufficiently advanced to permit of a report at the present time. The most recent article upon these accessory arteries is by a Russian surgeon, Seldowitsch. In an examination of 150 cadavers, he found an abnormal number of renal arteries in 43, i. e., 30.5 per cent.

There may be either two or three renal arteries arising from the aorta. The double renal artery was present twenty-eight times on the left and twenty-five times upon the right side.

The manner of distribution of the accessory arteries to the kidney is shown in Figs. 6 to 9, inclusive, some of which were taken from our specimens.

(a) One artery to the hilum and the other to the upper pole. (b) One to the upper angle of the hilum and the other to the center of the hilum. (c) One to

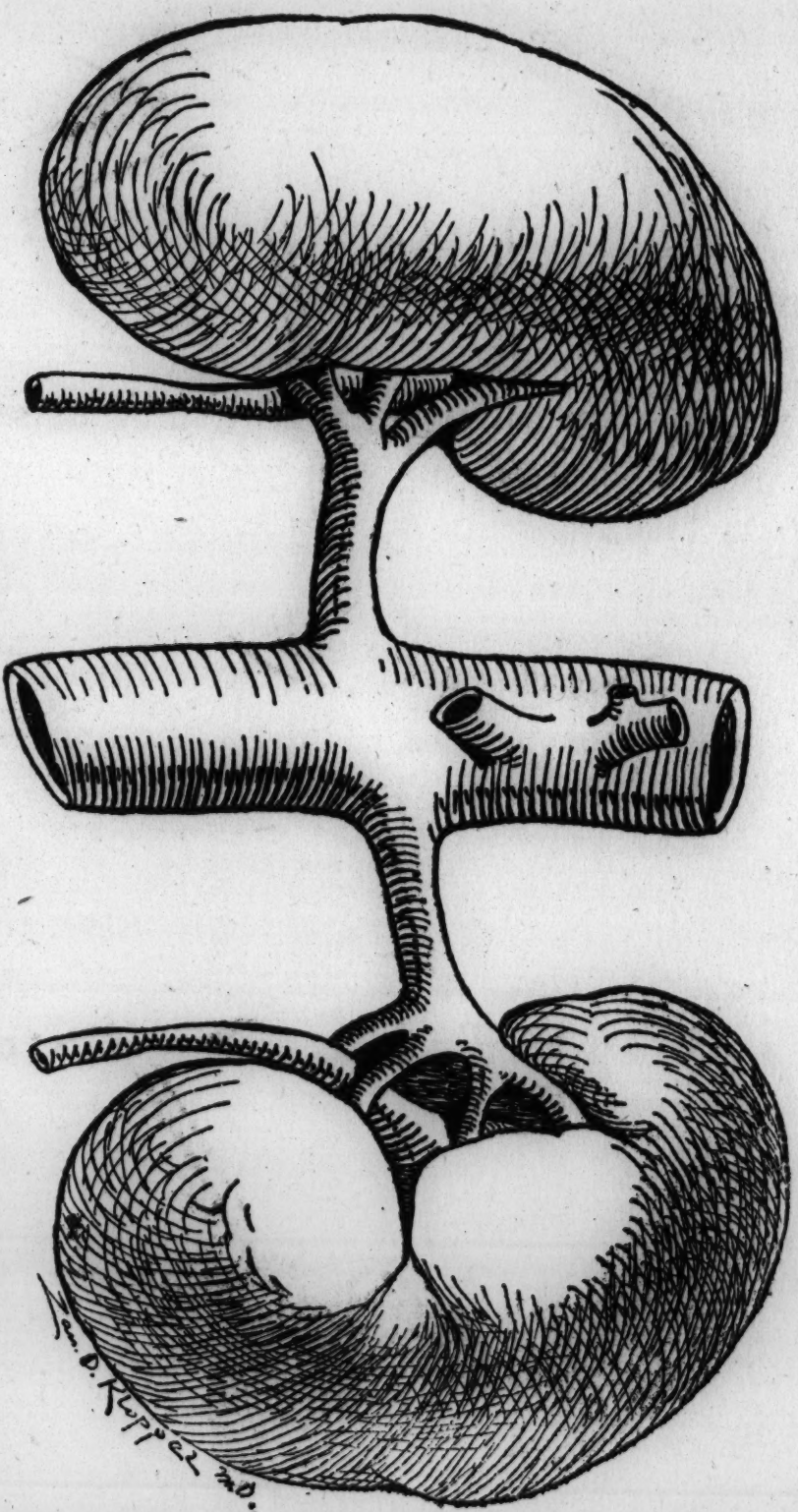


Fig. 5. Normal renal arteries. A single trunk arises from aorta and divides close to the hilum. Note the retropelvic branch upon the left side.

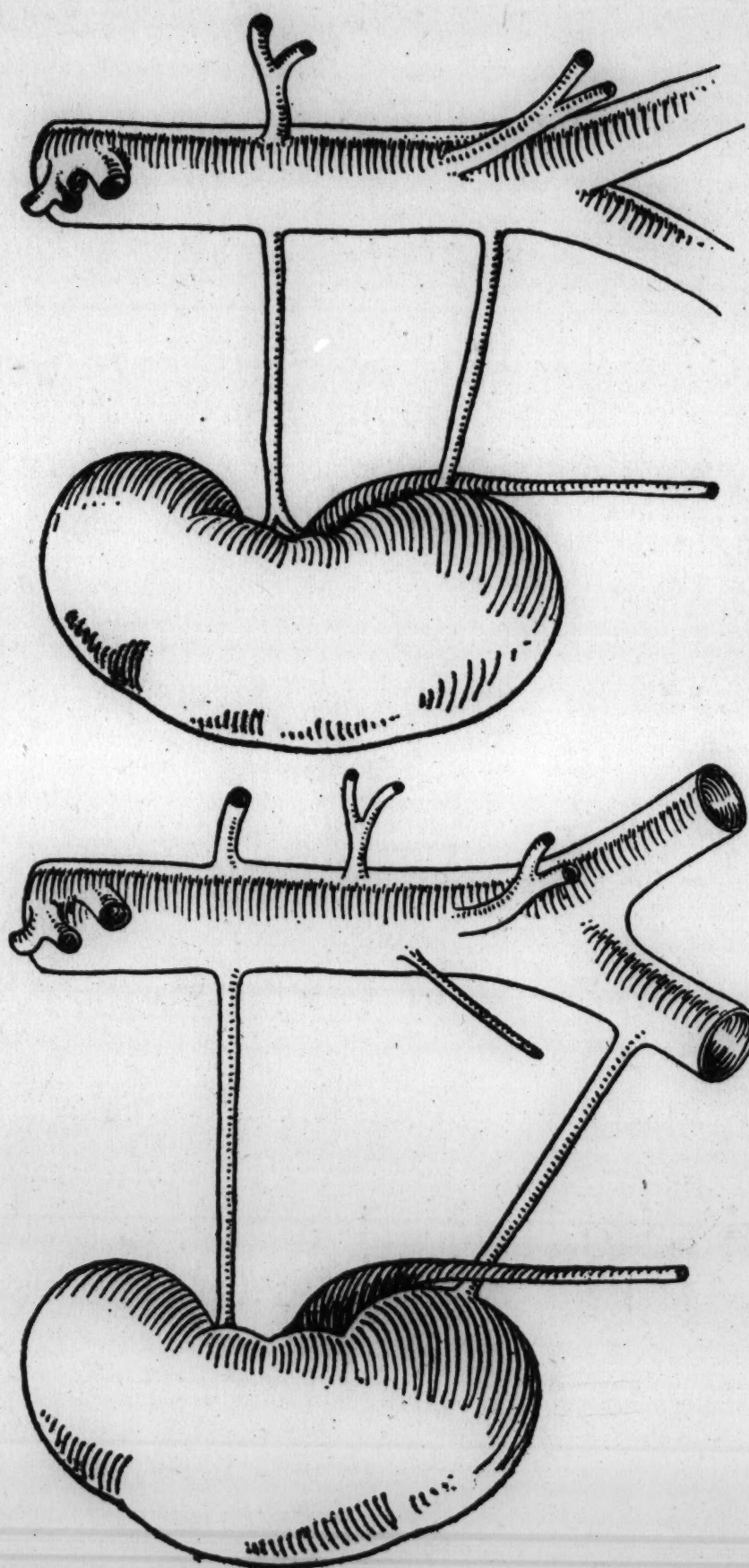


Fig. 6. One renal artery to the hilum and an accessory to the lower pole arising from the iliac.

Fig. 7. Two separate renal arteries arising from the aorta and entering the hilum of the kidney.

the lower angle of the hilum and the other to the center of the hilum. (*d*) One to the lower pole and the other to the hilum. (*e*) One from the aorta and the other from the iliac artery. (*f*) Three separate renal arteries arise from the aorta upon each side.

These accessory vessels may arise from all parts of the abdominal aorta, or even from the iliac arteries.

In nephrotomy one has most to fear from accessory arteries passing from the aorta to the upper or lower pole. To avoid these one should incise the poles as little as possible.

In nephrectomy it is always advisable to look for an accessory artery before ligating the pedicle. After nephrectomy such an accessory artery passing to one of the poles may be torn off and serious hemorrhage occur before the source is discovered. A knowledge of the presence and relative frequency of these accessory arteries will be found to be of considerable importance to the surgeon.

Types of renal pelvis. The impression that only one type of pelvis exists is erroneous. This is also of great importance to the surgeon in connection with the operation of pyelotomy for the removal of calculi in the renal pelvis.

There are, in general, two types of pelves:

(*a*) The classical ampullary type, i. e., a large sac occupying the entire hilum without division into large primary tubes. It is a wide sac from which a number of short primary tubes, or calyces, are given off, into each of which the apex of a renal cone or papilla opens to permit the urine to escape into the pelvis of the kidney. In such a type of pelvis, which occurs in about 30 per cent of cases (Delbet and Mocquot), a calculus can be easily found through either a pyelotomy or nephrotomy incision.

(*b*) The ramifying type of pelvis. This is the more

frequent form, and the different varieties are shown in Fig. 12. The most common form is the bifid, i. e., the ureter expands, as soon as the kidney hilum is reached, into the pelvis of the kidney. This is relatively small and divides into two or three large primary calyces, i. e., the bifid or trifid type of pelvis. In the case of more frequent bifid type, one large tube leaves the pelvis at an oblique angle and receives the urine from the upper half of the kidney through a number of secondary tubes or calyces proper, while the other tube runs transversely and, after dividing into a number of secondary tubes or calyces, receives the urine from the lower half of the kidney. In the trifid pelvis (Fig. 12) the three primary calyces receive the urine from the upper, middle, and lower thirds, respectively. The importance of these recent anatomical investigations lies in the fact that in some cases it is necessary to combine a nephrotomy with a pyelotomy, in order to find a calculus. It is superfluous to add that after dilatation of the pelvis or destruction of the parenchyma from the presence of calculi, such pelvic relations are of no value.

If the radiograph shows more than one calculus, or if one wishes to be absolutely sure not to overlook a calculus hidden in the parenchyma or in a dilated calyx, a nephrotomy, laying the kidney wide open after the manner of an autopsy, is the only safe method. The incision is usually made a little behind the midline of the convexity of the kidney.

Relations of vessels to the pelvis. A knowledge of the relations of the renal vessels is essential in the performance of a pyelotomy, i. e., opening the pelvis to extract a calculus. The renal artery and vein lie on the anterior aspect of the pelvis. Both divide into branches at this point, and from the artery a retropelvic branch arises, which arches across the upper border

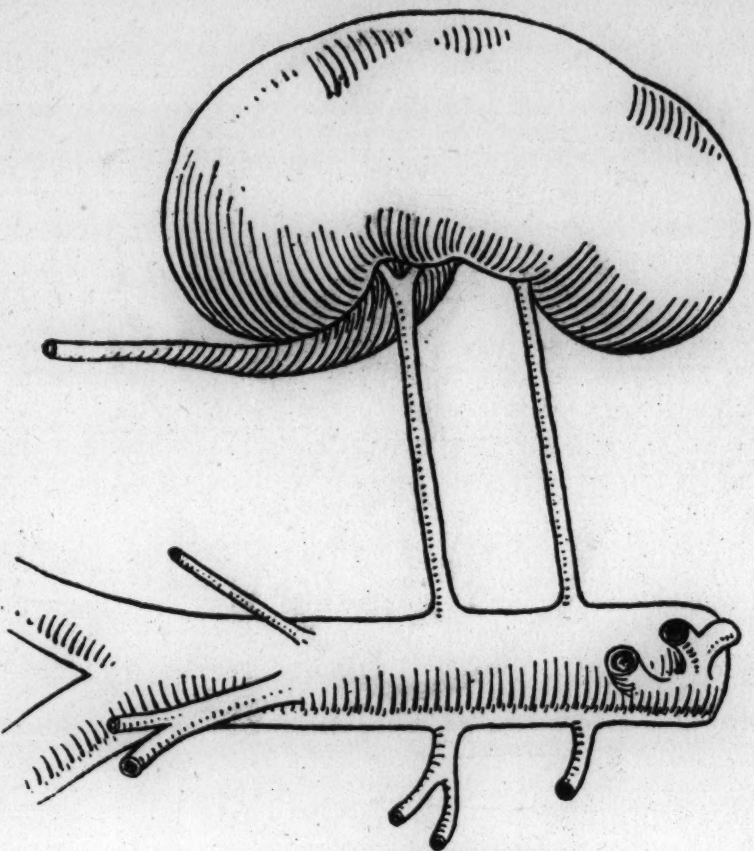


Fig. 8.

Fig. 8. The main renal artery enters the hilum, and the accessory artery passes from the aorta to lower pole.

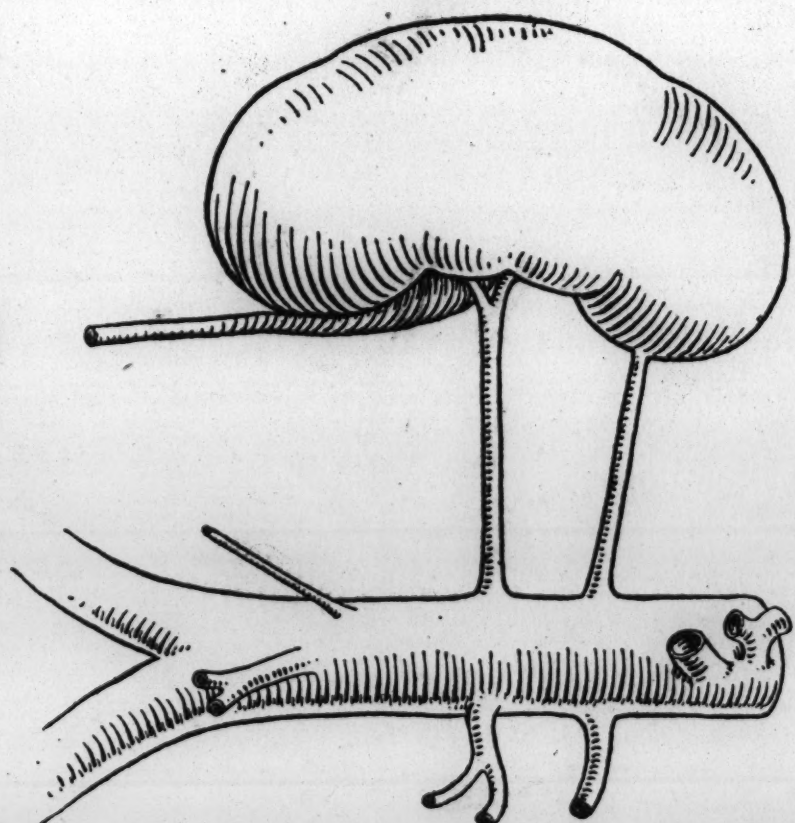


Fig. 9.

Fig. 9. The main renal artery enters the hilum, and the accessory artery from the aorta to upper pole.

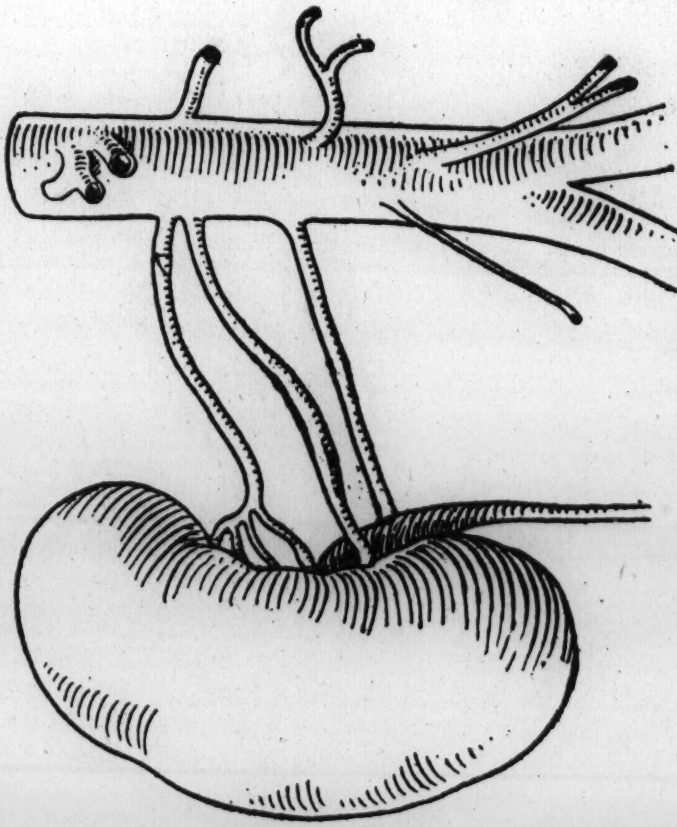


Fig. 10.

Fig. 10. Three renal arteries, each arising separately from the aorta.

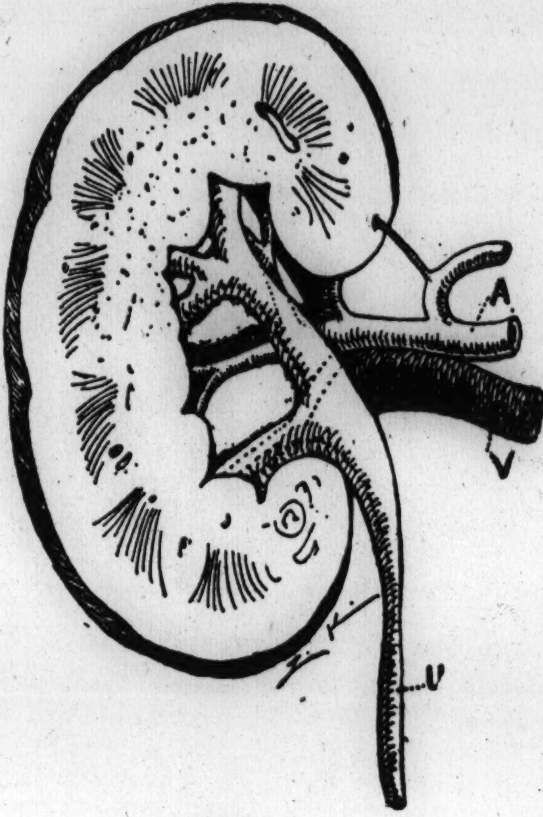
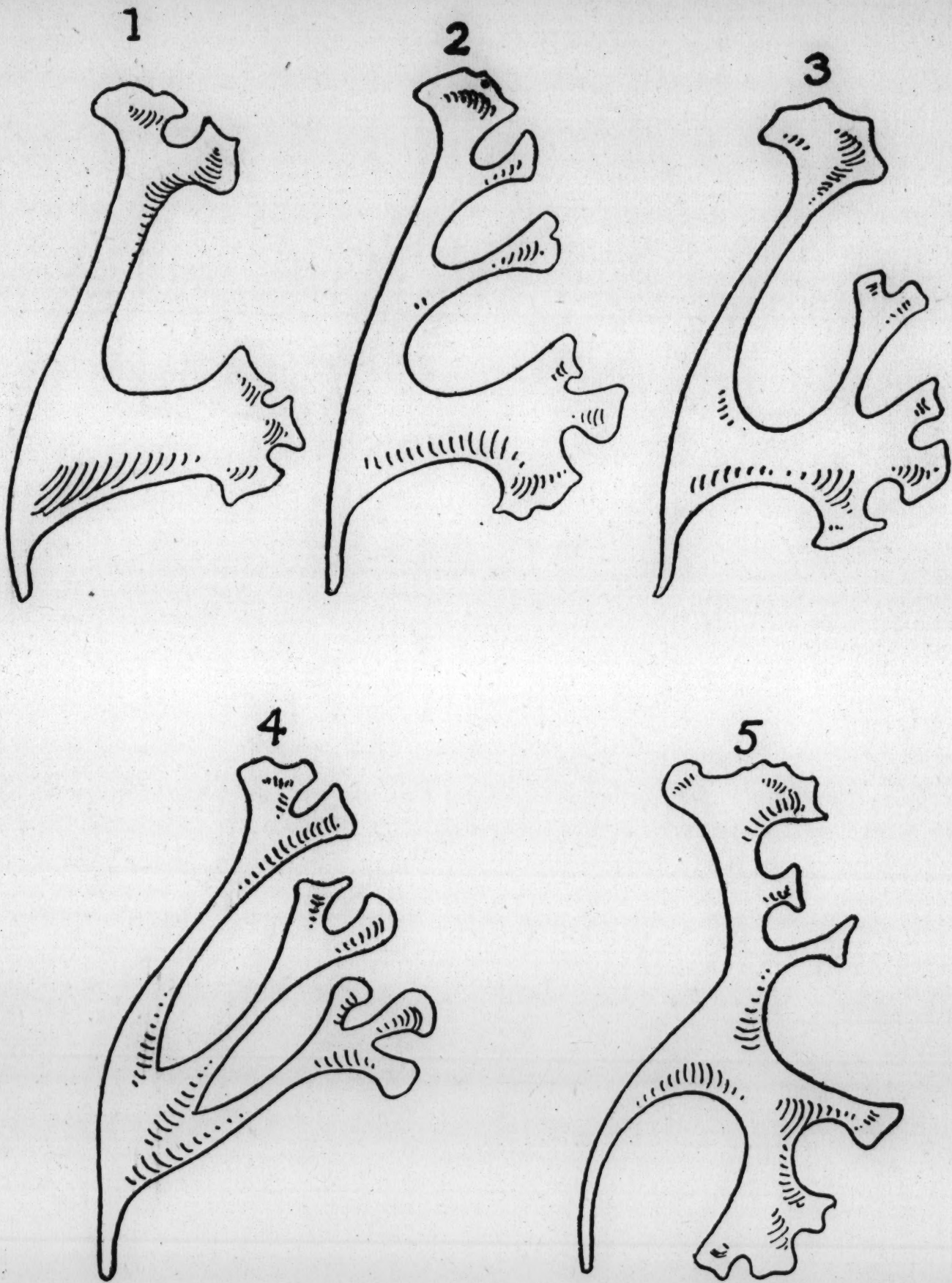
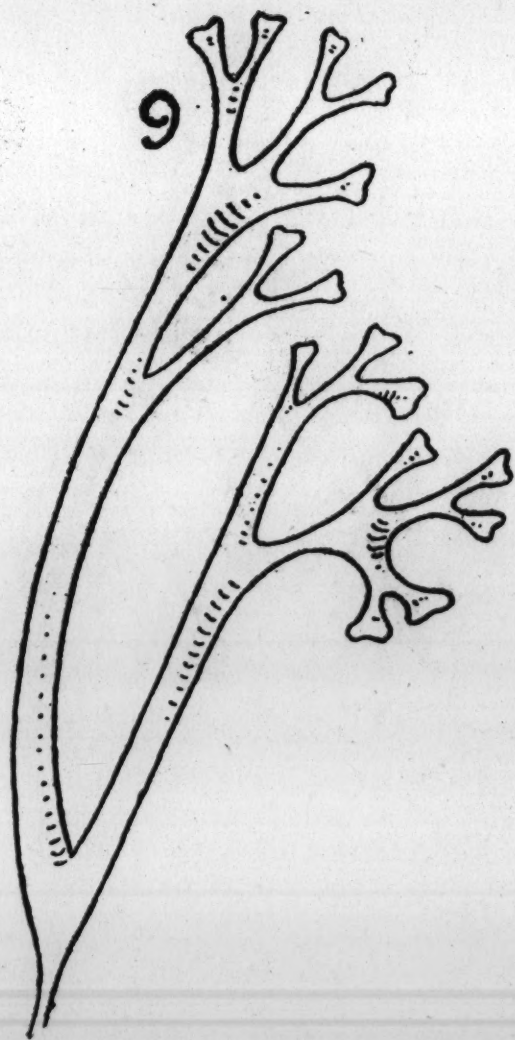
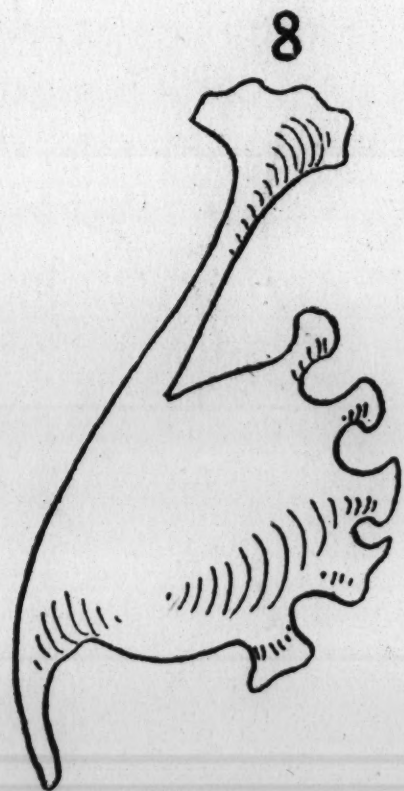
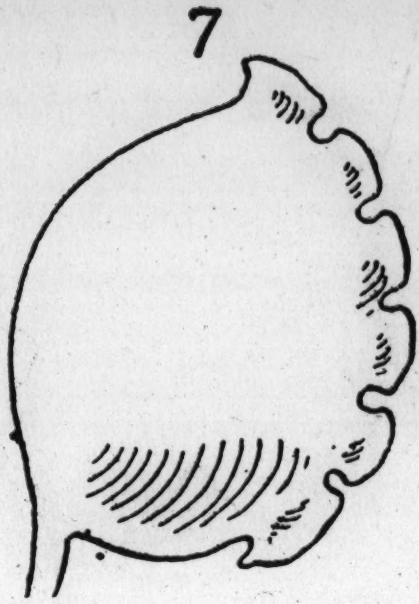


Fig. 11.

Fig. 11. Posterior view of the relation of vessels to the renal pelvis (Albarran). A, renal artery. V, renal vein. U, the ureter. Note that pelvis is free on the posterior aspect except for retroperitoneal artery (in dotted outline).



Various types of renal pelvis.
 1, 2, and 3, forms of bifid pelvis;
 4 and 5, trifid pelvis;



6, 7, and 8, ampullary forms;
9, unusual bifid type.

of the pelvis, to pass across it to the kidney proper (Fig. 11). By making an incision into the posterior aspect of the pelvis one can avoid all vessels except the relatively small retropelvic artery, hence this side is the one to be chosen for pyelotomy.

Effects of compression of renal vessels on the kidney parenchyma. Dr. D. C. Strauss and the writer are at present making a series of experiments upon animals to determine the effect of compression of the renal vessels upon the parenchyma of the kidney, such as is made during nephrotomy for renal calculi. The results of the microscopical examinations will be published in a later paper, but so far we have found that marked macroscopic changes follow compression lasting over half an hour.

4. *Choice of operation.* The question which confronts the surgeon after the diagnosis of renal calculi has been confirmed by a radiograph is, Can a conservative operation, i. e., nephrotomy or pyelotomy, be performed or should the entire kidney containing the calculi be removed? This question can be answered only by a consideration of certain preliminary data, which every operator must possess. The first requisite is that one must know the working capacity of each kidney, obtained through the use of the ureteral catheter and the most reliable tests of the functional capacity of a kidney. It is beyond the scope of this article to describe the technical steps of these tests, and it will suffice to say that, although the various procedures,—cryoscopy, use of indigocarmine and of phloridzin, etc.,—were at first regarded as almost infallible by the advocates of the individual tests, we have now reached the stage where most reliance is to be placed upon the chemical and microscopical examination of the urine obtained separately from each kidney, taken in conjunction with the indigocarmine and phloridzin. The

latter two can be regarded only as of relative value, since it has been found by recent observers that the phloridzin test can prove negative in perfectly healthy kidneys, as well as in unilateral disease. On the other hand, it can be positive when both kidneys are diseased; hence one cannot draw any conclusions from the negative results as to the pure functions of the kidneys, or conclude anything regarding the healthy condition from the positive results. A kidney whose parenchyma is to a great extent destroyed does not excrete any sugar. In unilateral diseased kidneys, if the phloridzin test is at all positive, the diseased kidney excretes a less amount of sugar than the healthy one.

The only absolutely safe method would be to expose both kidneys before performing a nephrectomy, but even then one cannot rely upon palpation to determine whether a kidney will functionate. But few surgeons have as yet the courage to do this, so that we must depend upon the urinary examination and phloridzin tests for the present.

The second requisite is to know whether to choose extraction of the calculus through an incision through the posterior aspect of the pelvis (pyelotomy), or to enter the pelvis through an incision through the convexity of the parenchyma (nephrotomy).

Whether pyelotomy or nephrotomy shall be performed depends upon (*a*) the condition of the urine and of the kidney, (*b*) upon the location of the calculus, and (*c*) upon the type of pelvis. Nephrotomy is always indicated in infected cases when the urine contains pus or is ammoniacal or there are gross pathological conditions in the kidneys, such as pyelonephritis or pyonephrosis. Pyelotomy can be considered only in aseptic kidneys. If the pelvis is small and entirely intrarenal, i. e., if it is of the bifid or trifid type, spoken

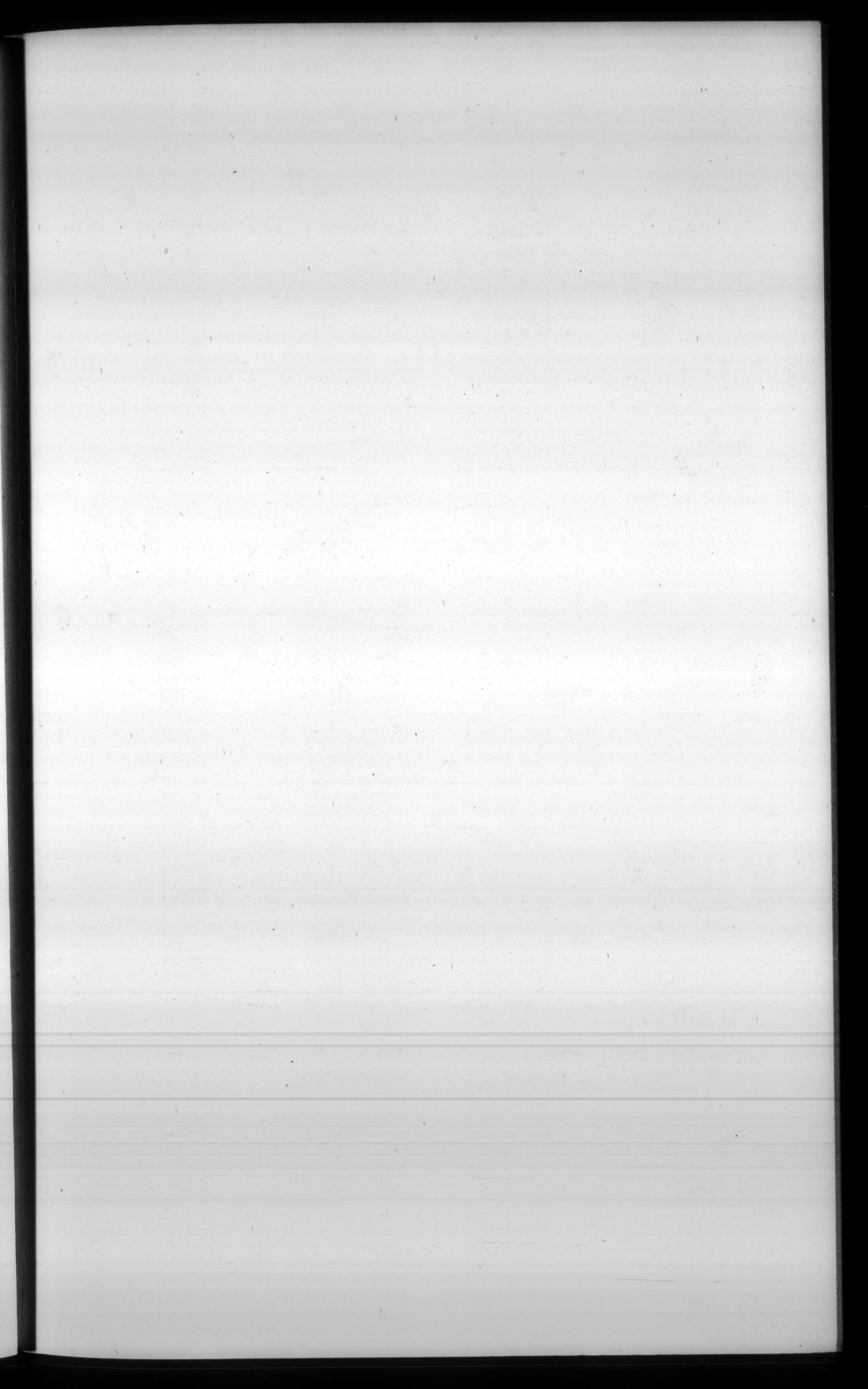




Fig. 13. Bilateral renal calculi. Case of Dr. Anna M. Braunwarth. Note the long shadow (left) due to the calculus extending into the ureter.

of above, pyelotomy is almost impossible, unless the calculus is situated close to the orifice of the ureter. In calculi which the *x*-ray shows to be located at the outlet of the pelvis, the operation of pyelotomy is to be preferred, provided that the other conditions spoken of above do not offer any contra-indications.

There is but little danger of fistula following a pyelotomy, provided the urine is aseptic. If it is not possible to remove the calculus by a pyelotomy alone, the incision can be prolonged, according to Zondek, along the dorsal wall of the pelvis into the parenchyma. If the *x*-ray shows a calculus in the lower pole of the kidney, one can try (by aid of palpation of the exposed kidney) to remove it by pyelotomy, if it lies in the inferior primary division of the pelvis. If the calculus lies in the upper major calyx, nephrotomy is indicated. Pyelotomy cannot be done, as Israel has pointed out, unless the kidney can be fully brought out to the surface of the skin.

Nephrotomy is indicated if a branched calculus is present, or if multiple calculi are scattered throughout the kidney or in the parenchyma. There is only one danger in nephrotomy, and that is hemorrhage, but this can be reduced to a minimum if compression of the vessels at the pedicle is made during the incision into the kidney. This compression can be either with the fingers or with some clamp. The clamp cannot be applied unless the kidney pedicle is fairly long, and the kidney can be brought well into the wound. Digital compression performed by an assistant is, as a rule, tedious. Some operators use a rubber constrictor around the renal vessels. This has no advantage over the clamp, whose blades are covered with rubber tubing.

The questions which arise in cases of bilateral calculi are whether one should operate in two sittings or remove the calculi from both kidneys at one sit-

ting. The majority of surgeons are of the opinion that it is best to employ the former method, the indications for nephrectomy being the same as those to be outlined below.

There is only one danger in operating upon these cases in two sittings, and that is, calculous anuria may result from blocking up of the opposite kidney after the removal of calculi from the one side. This condition, however, can be readily remedied by removing the calculus from the obstructed ureter.

Indications for nephrectomy. The method used to expose the kidney and to perform the various operations for the removal of calculi, whether nephrotomy, pyelotomy, or nephrectomy, is so generally accepted, that it is unnecessary to describe the technic here, further than to say that in a case of nephrectomy one must have accurate knowledge of the condition of the opposite kidney, and the kidney operated upon must be in such a condition that it no longer has any functional capacity, and that its retention is a menace to the patient's life and will probably require a secondary operation.

As to how large a calculus must be in order to afford an indication for nephrectomy, is a matter of individual experience. Many large calculi have been removed through a nephrotomy incision, with uneventful recoveries. The indication for nephrectomy depends rather upon the amount of kidney tissue which will be left after the removal of the calculus. Extensive destruction of the kidney as the result of suppuration is one of the chief indications for a nephrectomy in calculous cases.

DISCUSSION

DR. M. L. HARRIS (Chicago, Ill.): I can add nothing to the paper which has been presented except to emphasize those points which have been impressed on all of us who have operated much on kidney-stones. The necessity of

knowing the condition of both kidneys is extremely important. The great frequency of bilateral stones is a fact which has been recognized lately by most surgeons. It is impossible to determine bilateral stones by the symptoms. The symptoms are limited so frequently to one side, for at least a long time, that by depending entirely on the symptoms one may be led to operate on that side and forget, or neglect, to examine the opposite side. This was forcibly illustrated to me the past week. A patient came to me with a history of renal stone, with repeated attacks of renal colic in the left side, and I sent him to the hospital for the purpose of examining the two kidneys by catheterization. We set the appointment two days ahead. On the morning on which I was expected to make the examination the patient got to the hospital before I did and had an attack of acute renal colic on the right side. Up to that time he had had no symptoms whatever of involvement of the right kidney, yet just on the eve practically of doing something for the left-sided trouble he suddenly manifested evidences of involvement of the opposite side. After he had passed over his colic I catheterized both ureters and found involvement of both kidneys. That shows that we should invariably examine both kidneys, not only by the *x*-ray, but by separating the urine in every case of kidney trouble on which we expect to operate. That I think is the most important lesson that we are to draw from this excellent paper.

DR. LEONARD FREEMAN (Denver, Colo.): I should like to speak of an important complication in operating on kidneys for stones, and that is secondary hemorrhage. It is an extremely unfortunate thing to have operated upon a kidney and successfully removed the stone, and have the patient go on in the best of condition for a week or ten days and then begin to have a little blood in the urine, a little more the next day, and perhaps a little more the next, and then a severe and dangerous hemorrhage. These hemorrhages are not infrequently fatal. The only thing we can do under these circumstances is to remove the kidney, and the sooner this is done the better. This again illustrates what Dr. Harris has said, that it is necessary to know before we extract a stone from one kidney whether the patient has another kidney or not, and whether that kidney is doing its duty, because, in the face of a severe secondary hemorrhage, it is impossible to find out the condition of the second kidney. I have had two such hemorrhages, one beginning on

the 7th and one on the 9th or 10th day. They both began lightly and increased during the course of several days to the danger-point. In each case I did a nephrectomy under desperate circumstances, using salt solution and adrenalin intravenously and had the satisfaction of seeing the patients recover. But it was a very "close call" in each case. In one case the kidney which I removed showed where the stone had lain in a cavity. A blood-vessel was stretched across the center of the cavity, and ulceration had taken place into the lumen of this vessel. In the other case a necrotic spot appeared in the kidney at the site of a cyst, the hemorrhage having come from this source.

I wish to say a word with reference to getting blood-clots out of the bladder. When the bladder fills up with blood-clots until it is impossible to get them out with the largest-sized catheter, it has been advocated that the bladder be opened above the pubes, or the blood-clot sucked out with the apparatus used to clear the bladder of détritüs after litholapaxy. But such an apparatus is not always at hand, and a much better thing to do is to employ one of the ordinary "grease-guns" used for inserting hard oil into the transmission of an automobile. They have a long point as large as the end of one's little finger, which can be attached to a large-sized catheter, and it is then an easy matter to suck clots out of the bladder, as I have done on a number of occasions.

DR. ARTHUR C. STOKES (Omaha, Nebr.): I have a very interesting specimen I should like to show of a stone in the kidney. This stone gave almost no symptoms of its existence. Preceding the operation for the removal of the kidney the patient was operated on, a diagnosis having been made of floating kidney. An incision straight through the muscles of the back was made, and in an attempt to tie the kidney up to the back a lot of pus was found. The surgeon was not prepared to remove the kidney. The patient came under my care at that time, and the kidney was removed. While the patient had almost no symptoms of stone in the kidney, the kidney was almost entirely destroyed. Its parenchyma is almost entirely gone, leaving only fibrous tissue here and there. The stone remains in the kidney as it is. On removal of the kidney perhaps a quart of pus came out of the pelvis and around the kidney. The pelvis of the kidney was practically destroyed.

I wish to lay emphasis upon the great care that should

be taken in the diagnosis of renal stones. There is no symptom, nor set of symptoms, pathognomonic of kidney-stone. It has happened to me several times to have made an absolute diagnosis of stone in the kidney, when upon entering the kidney I found no stone. This is embarrassing. I feel that the very careful technical use of the x -ray as has been outlined to-day is a very valuable thing in kidney-stone in differentiating it from pyonephrosis, pyelonephrosis, and so on.

DR. CHARLES H. MAYO (Rochester, Minn.): I believe there is no other major operation which is entered into with less working out of the details of diagnosis than operative work on the kidney. Many times we see very good surgeons who undertake an operation on the kidney just because there is a tumor present when it would take only a little more time to determine the functional capacity of both kidneys and to see if any emergency, such as Dr. Freeman mentioned, exists in connection with the operation for stone in the kidney. One gets along so far in kidney work that he feels he must take out the kidney, accidentally taking off its vessels. The kidney is removed, and if he had only known the functional capacity of the other kidney before operating he would have taken pains in getting down to it, feeling, above all things, that he must preserve the kidney, after removing the stone.

As to anomalous vessels: This is a point we have been working on for some years. Within a year Dr. William J. Mayo brought out a paper on movable kidney, and in operating he found anomalous blood-vessels in some of the cases with a kinking of the ureter. Such conditions can be diagnosed and we feel that, in the bulk of these cases of hydronephrosis with movable kidney, the condition is produced by the sinking of the kidney at the point of traction.

DR. A. W. ABBOTT (Minneapolis, Minn.): In regard to the anatomy of the arteries of the kidneys: There was one case reported by Dr. McArthur, of Chicago, in which the supply was from the external iliac. In a case of my own this supply was from the internal iliac. They were both congenitally displaced kidneys.

DR. EISENDRATH (closing the discussion): The specimen which was passed around by Dr. Stokes is an excellent illustration of something I was going to show a picture of and explain why the doctor did not have pus in the urine

and why the findings at the operation were so much of a surprise. If you will notice the kidney you will find it is the seat of secondary changes. In other words, there is a condition known as lipomatosis reris, which has taken place in the kidney. The blocking of the ureter by a calculus probably prevented a considerable quantity of the pus that was present from escaping. We can easily understand why such pus which remains in the kidney is sterile.

In regard to the question of secondary hemorrhage raised by Dr. Freeman: It is one of importance, and it is one that is hard to overcome except in this way. I say it is hard to overcome, because so many of these kidneys do not have a solid parenchyma. So many are like the kidneys he removed. This pathologic kidney was an example of it. In these hydronephrotic kidneys the ordinary method of controlling hemorrhage, such as is used after nephrotomy, does not count. We do not suture the kidney as we do the intestine or liver, but in putting in our sutures we include as much of the parenchyma as possible, and only in that way can we catch the larger arteries as they come up from the pelvis to branch off and disappear in the kidney parenchyma. Where the kidney is full of hydronephrotic cavities it is impossible with such deep sutures to catch every artery, so it is practically impossible to do this in these cases, especially if there are old-fashioned secondary hemorrhages where the artery is ulcerated as the result.

I heartily endorse what Dr. Mayo has said. I did not mention the matter in regard to the lower pole artery in intermittent hydronephrosis.

The other point, that we ought not to undertake at the present time an operation on the kidney without knowing as nearly as we can the functional capacity of the opposite kidney, is well taken. I think it is absolutely criminal to do otherwise. In the latter part of the paper which I did not read I took up the question of functional capacity of the kidneys. I simply want to summarize what we now know of the functional capacity of the kidneys. There was a time, say, five years ago, when we made use of indigocarmin and phloridzin and cryoscopy. We thought we had got to the last step where other things showed a normal reaction to these tests, but one by one they have been knocked out. The only advocate of cryoscopy now is Kummell. The finding of the freezing-point of the blood at O. 5 to O. 8 or below that, is no longer a crucial test because there are many

cases operated on where the kidney does not functionate afterwards. Indigocarmin is not reliable. Of the three tests the phloridzin test has stood fairly well, but it is not infallible for it has been found in a large number of cases that the phloridzin test will leave you in the lurch. Examination of the urine is important, to see what the condition of the urine is from the right kidney and how much is secreted in a given length of time, what consistency it has, and what percentage of urea it has. That is our best test, and I would like to add that a valuable aid is the determination of the relation between the percentage of urea and the body weight as to the capacity of each kidney to take care of its share of the body metabolism.

ABNORMAL MOBILITY OF THE LIVER AND CONSTRICTION LOBE OF THE LIVER

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The upper abdomen is the seat of a number of obscure affections, and the object of this paper is to present my experience with two of these conditions, which, I think, are much more common than their recognition in the past would lead us to believe.

The conditions to which I refer are movable liver and what may be called constriction lobe or floating lobe of the liver, the "Schnürlappen" of the Germans and "Lobe flottant" of the French.

The existence of the first of these conditions has been known for one hundred and fifty years, but nearly one hundred years passed before a second mention of the fact is found, while the second condition seems to have been recognized only during the past few years. The literature is comparatively meagre, which may be accepted as an indication of the failure to recognize the cases rather than of their unimportance.

The liver, like the kidney, possesses a normal range of motion, hence the term *movable* liver is used entirely in a relative sense and is applied to an organ which is movable beyond the normal range. The liver has a sliding motion forward and downward during inspiration, returning again to its normal location during expiration. It likewise moves to the right or to

the left in accordance with the degree of fullness or emptiness of the stomach.

In making these movements the convex upper surface of the liver follows accurately the concave surface of the vault of the diaphragm and the abdominal wall, and the whole organ moves about its fixed points, namely, the vena cava, the adherent posterior surface, and the coronary ligaments.

The suspensory ligament is misnamed in that it does not aid in the suspension of the normally placed organ, but simply limits its normal range of motion and is therefore not even made tense under ordinary conditions.

The liver is retained in its normal location by its fixation to the inferior vena cava, by the adhesion of its posterior border to the rather fixed portion of the diaphragm, by the coronary ligaments, by atmospheric pressure, and by the support given it by the organs on which it rests, this last factor depending in turn on the firmness, tone, and contractile power of the anteriolateral abdominal walls.

When the liver is abnormally movable some or all of these retentive factors are altered. The condition most commonly found associated with movable liver is a relaxed and pendulous abdomen, and as this is found much more frequently in women than in men so do we find movable livers much more frequently in women. However, as movable liver is occasionally found in men and likewise in women with firm abdomens, and as an unusual range of motion in such subjects is only possible by reason of unusually long and lax attachments, such elongated attachments were looked upon as congenital defects, and evidence was sought in the dead-house in support of this supposition.

It was found that occasionally the inferior vena cava was very loosely attached to the bodies of the ver-

tebræ, that the posterior border of the liver uncovered by peritoneum and attached to the diaphragm was unusually small, and that the coronary ligaments were so long as to form a veritable mesohepar, and, furthermore, Wassiljew found such a congenital mesohepar in the body of a child, and Birch-Hirschfeld found one in a new-born so long as to permit the liver to hang down as low as the umbilicus.

The existence of such congenital defects is therefore established. That they are probably the essential factor in the production of movable liver in this class of cases seems reasonably certain, for, were the ordinary diseases, injuries, and strains of life to which all are subjected capable of developing the condition, it would be much more common in men than is the case.

In women with lax, pendulous abdomens the situation is somewhat different, as other factors come into play, and the movable liver becomes but a part of a general visceral ptosis or Glenard's disease. Yet in some women of this type the liver is scarcely at all abnormally movable, while in others it is so markedly movable as to be the chief element in the production of the distressing symptoms.

In the latter class probably the congenital defects above mentioned coëxist as essential factors, as well as the presence of a congenitally shortened ligamentum teres, as shown by Neugebauer and the influence of which, on the production of movable liver, has been forcefully emphasized by Landau and Hertz.

The withdrawal of the support afforded by a firm abdominal wall invites a general sagging of the abdominal contents to the lower abdomen when in the erect position, while atmospheric pressure compresses the upper abdomen materially reducing its capacity. The liver yields by gliding forward and downward, but the cardiac end of the stomach, unable to recede

from the vault of the diaphragm, crowds the liver still further to the right as the stomach becomes distended with food and gases.

The long-continued operation of these factors leads to a gradual lengthening of the liver's attachments with the development of abnormal mobility.

The liver in these cases does not drop straight downward, but executes a sliding movement from behind forward and downward and from left to right, and may attain such a degree that the anterior right border may reach as low as the brim of the pelvis and the whole organ lie in the right half of the abdomen.

The symptomatology of movable liver is not distinctive enough to be diagnostic, yet sufficiently so to be strongly suggestive and to lead one to make a careful examination with that possibility distinctly in view.

In the general visceral ptosis cases, which are easily recognizable, the extent, if any, to which the liver participates in the general condition usually is not difficult to determine on examination. However, it is in those cases in which the movable liver is the sole or at least the chief abnormal condition that a correct diagnosis is most difficult, and it may be said right here that in the majority of those cases thus far reported the diagnosis was not made until after the abdomen had been opened. The most common symptom noted is pain, usually located in the upper right quadrant of the abdomen. It is variously described as a dull ache, a drawing, pulling sensation, a feeling of weight and dragging, and at times an actual pain of variable duration extending through that region or into the shoulder. One of my patients said she could feel something move in the abdomen on turning from the right to the left side when lying down.

Next in frequency to the pain has been noted gastric disturbance. This may be nausea, belching, dis-

tension, and rarely vomiting. Occasionally the patient has personally noticed a swelling or an enlargement in the abdomen.

In making a physical examination it should be remembered, first of all, that the liver has a tendency to resume its normal location when the patient is in the recumbent position. The area of hepatic dullness should be outlined with the patient in different positions, as, for instance, in an inverted or partial Trendelenburg position, in a semireclining position, and when lying on the right and then on the left side.

In movable livers the change in the area of dullness is very marked, while in the normal individual it changes only slightly if at all.

The posterolateral area is particularly important, as the dullness may disappear entirely on changing from the semi-inverted to the semireclining position. Considerable variation is also apparent in changing from the right to the left lateral position.

Of course the lower or anterior border of the liver should be outlined by palpation. Occasionally a movable liver may become fixed by adhesions in a displaced position and thus lose much of its abnormal mobility. It is evident from this description that the diagnosis must rest on the physical findings, and it is essential that one have the condition in mind when making the examination in order to bring out the characteristic points. The treatment will be taken up later.

The second condition to which attention is directed is that of the so-called constriction-lobe or floating lobe of the liver. The liver, although a solid organ, possesses the property of slowly yielding to pressure or traction, so that it may gradually become moulded or drawn into abnormal shapes, and the impressions thus made on the surface of the organ may become permanent.

Changes of this kind are not infrequently seen in the

form of grooves or furrows on the upper surface of the liver made by the hypertrophied attachments of the diaphragm in emphysema, or corresponding to the ribs when the liver has been pressed unduly against them, or as a vertical furrow, the result of prolonged lateral compression.

These particular changes, while interesting, have no special clinical importance. It is different, however, with the much more frequently found transverse furrow. This usually extends transversely across a portion of the anterior part of the superior surface of the right lobe of the liver and varies considerably in length and depth.

The importance of the groove or linear depression lies not in itself but in that portion of the liver which is marked off from the main lobe. It is this portion of the liver which develops into and constitutes the constriction-lobe. The name constriction-lobe, or "Schnürlappen" in German, is based on the supposed etiology of the condition, as the transverse groove coincides usually with the line of constriction produced by tight lacing or by the strings of the skirt bands in women or occasionally the belt in men. The influence of the tight band around the waist-line in the production of this condition is very evident. The influence of the corset on women is frequently misunderstood. A properly shaped corset, one that fits snugly below, is straight in front and not too high so as to constrict the upper zone of the abdomen, is not harmful in this particular direction and may be beneficial in that it supports the skirt bands and thus prevents them from forming a constriction around the body. The narrow band of constriction is essential to the production of the transverse furrow and the enlarged lobe below it, but the band can become operative in this way only in the presence of a definite antecedent condition of this portion of the body. This antecedent condition is

a diminished capacity of the upper zone of the abdomen, brought about usually by prolonged compression, which causes the liver to move forward and downward, thus bringing the anterior portion of the right lobe within the grasp, so to speak, of the constricting band, for under normal conditions the anterior border of the liver does not descend below the costal arch, and is thus above the line of constriction, or else the liver must be abnormally movable from other causes so as to permit it to descend below the line mentioned and thus bring it under the influence of the constricting band.

It is in aiding in the development of the antecedent condition that the old, high, tight-laced corset produces its deleterious effect.

It must not be understood that this condition occurs only in women who have worn corsets, for such is not the case, as I have seen it in women who did not wear corsets and who probably never had one on, and it is also occasionally seen in men.

The constricting band acts by pressing on the surface of the liver and subjecting that portion of the liver which is caught below the band-line to a more or less constant anteroposterior bending produced by the frequent bendings of the body, the varying fullness of the stomach and bowels, and their almost constant peristaltic movements.

The line of constriction acts like a hinge, and that portion of the liver below it gradually becomes elongated and enlarged until it forms a well-defined, distinct, thickened, freely movable lobe, while the transverse furrow gradually deepens by molding and pressure atrophy of the liver substance until in advanced cases little remains but a narrow thin layer transmitting enlarged blood-vessels and bile-ducts to and from the new lobe.

Very rarely this new lobe formation has been found

involving the left lobe of the liver instead of the right. The condition is much more frequent than is generally supposed. I have recognized and operated on several well-marked cases.

Leue, in a collection of 3484 autopsies made on bodies of persons over sixteen years of age, found constriction livers in 1.9 per cent of the men and in 25.3 per cent of the women. The frequency of the condition increased markedly with the age of the subject.

The symptoms in mild cases are practically nil, but in well-defined cases they may be quite distressing and are sufficiently characteristic to suggest the possibility of the condition to one who is familiar with the subject.

The symptoms are chiefly sensory in character and vary from a slight sense of discomfort in the upper right quadrant to attacks of distinct severe pain. When the lobe is large most of the patients complain more of the distress when lying on the back, owing to the weight of the lobe pressing on the structures beneath. One of my patients had discovered a movable mass herself, and others of them have mentioned a sensation of something moving in the upper abdomen.

Gastric symptoms are common and vary from slight indigestion to severe pain and vomiting.

Langenbuch mentioned the symptoms as more severe when the new lobe has its origin from the left lobe, as it then presses more directly on the stomach. The new lobes may become acutely congested and swollen, when they are more sensitive and painful.

Clinically, the cases sometimes resemble closely those of gall-stones, and I operated on one of my cases under that diagnosis, but found a well-defined movable lobe and a normal gall-bladder.

On a careful examination the movable lobe can

usually be recognized, and the diagnosis of course must rest on the physical findings. It is quite difficult at times to differentiate a movable lobe of the liver from a movable kidney which often coëxists and with which it is frequently confounded.

The range of motion of the two conditions is different, and when they coëxist careful palpation will enable one to recognize the separately movable bodies.

In the treatment of these cases the object to be accomplished is the fixation of the liver in its normal location or the fixation of the constriction lobe so as to prevent its abnormal mobility. This is accomplished by opening the abdomen in the mid-line, or along the right border of the right rectus muscle, and stitching the liver to the anterior abdominal wall high up or to the anterior portion of the diaphragm by means of good-sized catgut mattress sutures passed through the thickness of the liver near its anterior border with a round non-cutting needle. I usually denude the superior surface of the liver of its endothelium by rubbing it with a piece of dry gauze in order to insure the formation of more extensive adhesion. The suspensory ligament is then shortened by plication, and the round ligament cut off and sewed to the anterior abdominal wall as high up as possible.

Should there be a pendulous abdomen with marked diastasis of the rectus muscles this condition must be remedied by removing the intervening fascia between the muscles and stitching the muscles and their sheathes close together. When a constriction lobe is present this must be fixed in its normal location in the same manner.

DISCUSSION

DR. R. C. COFFEY (Portland, Oregon): I think we are indebted to Dr. Harris for some of these valuable contributions to the subject of ptosis, one especially, which was published several years ago, and which dealt largely with the

etiology and pathology of this condition, and has always been a kind of key to my observations since.

In the paper presented he set forth the fact that in most cases of ptosis, especially of the kidneys and organs in the upper abdomen, the organs were prolapsed for the reason that the upper part of the abdomen had become too small for the organ or organs. I have always taken that as a key in what work I have found it necessary to do in anchoring the kidney. We find trouble in anchored kidneys in those cases in which the operator has attempted to fasten the kidney up to where it was in the normal person. Such a thing, according to the work of Dr. Harris, will clearly explain the cause of pain in some cases and will effect redisplacement in other cases, because, if the upper portion of the abdomen above the waist-line has been decidedly diminished and we attempt to fasten a movable organ up at the highest point where it can be fixed, we have failure; while, if we fix the kidney where it is easily fixed, as Dr. Harris suggests, not simply put it back where it was because it is abnormally movable and makes disturbance there, we afford relief, but these cases are surgical only when they cause disturbance. In these cases I make it a point to fix the kidney where it can always be felt with the hand afterwards. The woman does not have pain and redisplacement, and the results are good.

As regards the liver: In twenty-two cases of ptosis of the stomach or gastroptosis I have found the liver displaced in four instances sufficiently to require suturing, and the technic I have employed is a little different from that described by Dr. Harris. I do not believe that it is at all necessary to scarify the liver. In the cases I have had there has been no redisplacement, and I have been able to keep the cases under observation. I have not scarified the liver and have used sutures through the liver, first shortening up the falciform ligament and suturing the liver in the center, the lower line of suture in the edge or up through the liver, following each lobe, passing one line of sutures around to the right, another to the left, and going entirely through the substance, located an inch away from the edge of the liver, and making a Y-ligament, coming down to the center and extending the arms out following each lobe.

There is no organ in the abdomen that can be fixed with such complete satisfaction as the liver. The results are just

as good in these cases as they are in other cases that are universally recognized as surgical.

DR. JAMES E. MOORE (Minneapolis, Minn.): At the meeting of the American Medical Association, held at Portland, Oregon, I had the misfortune to read a paper on ptosis, advocating that it was our duty to give to those patients who are in many instances neurasthenic the benefits of surgery. and I must say I have never had as much cold water thrown on me as I did at that meeting. I feel better now in my own mind than I did at that time. Those who took part in the discussion at that meeting said I was recommending surgery for a condition in which it was not indicated, but the very men who opposed operative procedures at that time are now doing such operations. In this connection I recall one case that I saw in consultation within a year. Dr. W. A. Jones, of Minneapolis, asked me to see one of these neurasthenic patients who was confined to bed most of the time, complaining of a tumor in the lower part of the abdomen. I found the right end of the liver was loose, so that when the patient was turned on the left side the edge of the liver ran up and down or was over to the middle of the abdomen. After declining operation two or three times I operated at the earnest solicitation of the patient and the doctor's suggestion, and replaced the liver. Shortly after the operation that woman got out of bed and has been traveling over the United States and other countries since. She is one of the most grateful patients I have. This case demonstrates in a very striking way that these people are entitled to the benefits of surgery, and if we can afford these benefits, we should do so. I do not excoriate the liver.

DR. A. F. JONAS (Omaha, Neb.): At the meeting held fore this Association some years ago, Dr. Jonas reported two or three cases where he had hung up the prolapsed liver, making a suspensory ligament of the gall-bladder. I would like to ask him if he has had any farther experience in this use of the gall sac?

DR. A. F. JONAS (Omaha, Neb.): At the meeting held in Chicago, I reported three or four cases of ptosis of the liver where the margin of the liver descended four finger-breadths below the right costal margin, and at that time I used the gall-bladder as a suspensory ligament. The patient being placed in the semi-Trendelenberg position, and the liver pushed up as far as it would go, I sewed the gall-bladder

to the upper margin of the incision, which was extended up against the costal arch. I reported three or four successes. I have occasionally done that operation since, but in no case except in those where the liver could be pushed into its normal position. When the liver is low and cannot be placed upward in its normal position, I do not feel that I would be justified in doing that operation, because traction on the gall-bladder would very much increase the pain from which the patient suffered prior to operation. I still think that this operation has a place in these movable livers,—those that move up and down, and cause a dragging sensation with pain in the right hypochondrium; and I shall continue to do it in occasional cases, but not in all instances, of ptosis of the liver.

TWO CASES OF OPERATIVE REMOVAL OF CERVICAL RIBS

SAMUEL C. PLUMMER, M. D.

CHICAGO, ILLINOIS

Until comparatively recent years cervical ribs had been looked upon as almost solely of anatomical interest, but now they are known to the neurologist as not infrequently causing intractable neuralgias, with other allied disturbances. The Roentgen ray has been of great assistance in clearing up the etiology of these formerly obscure cases of neuralgia. The logical inference that the removal of the rib would be followed by beneficial results has been borne out by experience, and thus the subject has been brought into the domain of surgery.

W. W. Keen, of Philadelphia, in the American Journal of the Medical Sciences for February, 1907, has discussed the subject of cervical ribs in all its aspects and at considerable length, also giving an extensive bibliography.

I shall attempt nothing more than the report of two cases which came under my care, feeling that the number of reported cases is not yet large enough to settle all questions arising in connection with this subject, so that such presentation will not be without value.

CASE 1. This patient I saw through the courtesy of Dr. Hugh T. Patrick, and the history is included, as Case 37, in Keen's article referred to above.

Woman, aged twenty-four; bookkeeper and stenog-

rapher. First seen on January 25, 1905. Pain had begun in the right axilla eight years before and had gradually extended down the inner border of the arm, gradually becoming worse. Any overexertion, such as prolonged writing or piano-playing, increased the pain, and she positively affirmed that any undue excitement had the same effect. About four years before being seen, she first noticed disability in the fingers, in trying to pick up a pin. Three years before loss of power in the thumb had reached such a degree that she could not hold a pencil in the ordinary way, and was forced to hold it between the index and middle fingers. By January, 1905, there was not only weakness in the small hand muscles, but the whole right arm was weaker. The pain seemed to start in the axilla and run down to the elbow and middle of the forearm, along the inner border. She had no pain in the hand or fingers, but occasionally pain seemed to extend from the axilla around to the scapular region. She did not know when the wasting had begun, but when she first noticed it two years before examination it had already become quite marked.

In the history of this case it is rather interesting to note that a diagnosis of writer's cramp had been made by a prominent neurologist, because of the difficulty in writing and the distress caused by it. Measurement showed the right hand, forearm, and arm each one-quarter inch smaller than the left.

No distinct anesthesia could be made out. The skiagraph showed not only a cervical rib on the right, the affected side, but also one on the left almost as large. As the left rib has caused no symptoms, of course, it has been let alone.

Operation, March 16, 1905, at Mercy Hospital, Chicago. Incision, three inches long, from clavicle at posterior border of sternocleidomastoid muscle, obliquely upward and backward. Skin and platysma di-

vided, also a part of trapezius and sternocleidomastoid, as these two muscles came close together and the portions cut were quite thin. Brachial plexus exposed. It was not necessary to expose the subclavian artery. The posterior belly of the omohyoid muscle was exposed, and drawn forward and downward along with the plexus and artery. The scalenus medius was laid bare and retracted backwards. There were no muscular attachments to the cervical rib. The cervical rib was now freed and cut off at its base with a chisel. A portion of the remainder of the rib was cut away with rongeur forceps. The rib was $1\frac{1}{4}$ inches long and $\frac{3}{8}$ inch wide at its widest part. Its anterior end was pointed and connected with the first dorsal rib by a slight ligamentous band. There was no injury to pleura. Catgut sutures were used in the muscles, and silk-worm gut in the skin. There was no drainage.

After the operation she suffered very considerable pain above the clavicle, about the site of the operation, not under the arm and along its inner border, as heretofore. This pain continued for about six weeks without much change, when it gradually diminished. However, as soon as the patient began to use the arm, such use caused pain in the scapular region, and if the exercise was continued the whole arm began to ache. There has been constant but very slow improvement. The patient was last seen by Dr. Patrick on August 10, 1906, and while the pain and tenderness above the scapula had almost entirely disappeared and she had no pain in the arm when quiet, exertion of almost any kind, if continued for more than 20 or 30 minutes, caused, at the first, discomfort and then a decided ache. As regards atrophy, strength, and function of the hand, it could not be said that there had been any improvement. On the whole, it was Dr. Patrick's opinion that the results of operation were disappointing, although

it was reasonable to suppose that improvement would continue for a long time.

On December 14, 1909, the patient wrote me as follows: "There seems to me to be little change, if any, in the condition of my hand during the last two years. It has not filled out any more nor have I any better use of it. Have considerable strength of the arm, but the hand does not gain any, especially the thumb and first finger. Do not experience much pain, although the site of the operation remains very sensitive. So you see I still depend greatly upon my left hand and I fear I shall always be obliged to."

The patient, as you see from this letter, is practically relieved of pain and this certainly seems to me a gratifying result, being a great improvement over the condition that Dr. Patrick found on August 10, 1906.

CASE 2. This patient was referred to me by Dr. Jos. L. Miller, to whom I am indebted for the clinical history.

Woman, aged 30 years, housewife. Has one healthy child. Mother is living and suffers somewhat from rheumatism; otherwise the family history is negative. The patient has good health except for her present trouble. No past history of severe illness. She relates that since she was about ten years of age, if exposed to severe cold, she would have pain in the ulnar surface of the right forearm. This discomfort occurred at infrequent intervals until about four and one-half years ago when it became more severe and developed more readily, moderate cold now being sufficient to induce it. For the last one and a half years even slight cold, as cool water, a summer breeze, or rising in the morning in a cool room, would excite pain.

Moderate use of the arm, even in a warm room, would bring on an attack and grasping anything in the hand would give rise to a cramp. In addition to the pain during this time the patient complained of stiff-

ness and coldness of the fingers, with inability to extend them. During an attack the fingers would become white. The trouble became so annoying that recently she has been practically unable to use the arm. When going out of doors it was necessary to wrap the hand and forearm carefully. The discomfort during all this time has been entirely in the forearm.

Gradually during the past year the patient has noticed increasing weakness in the hand and forearm, which had reached such a degree that she is not able to play the piano. About eight months ago atrophy of the thenar eminence and the interossei muscles was observed.

Examination.—Muscular strength of the hand much impaired. No apparent atrophy of shoulder, arm, or forearm, but decided atrophy of the interosseous and thenar muscles. Sensation not disturbed; careful search for areas of analgesia gave negative results.

There is no difference in the radial pulse on the two sides, not even on changing the position of the arm. The blood-pressure in the two arms is alike. The right hand is distinctly cooler than the left without any difference in color.

In the supraclavicular region there is nothing abnormal to inspection. Deep palpation causes slight discomfort in the ulnar region, similar to the pain from which the patient suffers. I was unable to recognize the cervical rib upon palpation, even when assured of its presence by the skiagram.

There is a slight bilateral simple goiter. The skiagram showed cervical ribs of about equal size on both sides. That on the left, however, had caused no symptoms.

Operation.—September 22, 1909, at St. Luke's Hospital, Chicago. Incision from just above the right clavicle at the outer border of the sternocleidomastoid muscle, obliquely upward and backward for a little

more than three inches, extending through skin, superficial fascia, platysma muscle, and deep fascia. The omohyoid muscle was exposed and drawn downward and inward. The brachial plexus was now exposed and retracted slightly inward. The first dorsal rib was now exposed and search made for the cervical rib. A small process was felt, but it seemed so much smaller than the skiagram had led me to expect that I proceeded to expose the first dorsal rib farther, until satisfied as to its identity. By this time the subclavian artery had come into view. It rose to a height of at least one and one-half inches above the upper border of the clavicle, and descended almost vertically. Neither the subclavian vein nor the pleura was seen. The cervical rib, having now been definitely located, a portion of the trapezius and scalenus medius muscles were cut through in order to expose it. A sudden contraction of the trapezius muscle made me think I had cut a branch of the spinal accessory nerve supplying that muscle.

Running from the tip of the cervical rib obliquely downward and forward to the first dorsal rib, could be seen a ligamentous band, probably an aponeurotic portion of a rudimentary intercostal muscle. The tip of the rib rested against the brachial plexus, and the rib gave origin throughout almost its entire extent to muscles which were cut with scissors. The rib was now cut across its base with a bone-cutting forceps, and removed. It measured a trifle less than one inch in length, while its greatest breadth was one-half inch. It was found to have a joint a trifle less than five-eighths of an inch from its tip. Some oozing in the depth of the wound necessitated gauze packing, which was removed on the second day following the operation. For a day or two after the operation the patient suffered pain similar to what she had previously experienced, but from that time on it gradually dimin-

ished, and in less than a month had practically disappeared. The coldness of the hand and forearm also disappeared, but a little more slowly. A little atrophy of the trapezius appeared just above the clavicle, but the upper portion of the muscle remained normal, and no disability in raising the shoulder was noticed, so that it was plain that only a small branch of the nerve had been cut.

In comparing these two cases it will be noticed that in the second the improvement began much earlier and progressed much faster.

In the first case it was necessary to retract the brachial plexus strongly, in order to free the tip of the rib, and this rough usage of the plexus I believe accounts for the increased pain which she suffered for six weeks after the operation. In the second case very little retraction of the plexus was necessary. I believe it highly desirable to handle the plexus as gently as possible.

The rib in the second case was the more difficult to identify and remove, because imbedded in muscles. Both of the patients had bilateral cervical ribs, but manifested symptoms on the right side only.

DISCUSSION

DR. JAMES F. PERCY (Galesburg, Ill.): Three or four years ago I saw three of these cases in one year. One of them was in a girl fourteen years of age, the daughter of a prominent politician of our state, and the case was referred to me because of a swelling in the neck above the clavicle. The father asked me to see the case with the late Nicholas Senn, and I mention these cases mainly to speak of his opinion in reference to operation.

This girl had some pain down the left arm, but it was not a constant pain. The thing that brought her to me more than anything else was the idea that there was possibly a sarcoma back of the clavicle. The x-ray showed very beautifully what the condition was. Dr. Senn advised against operation because the first operation he had done resulted in an opened pleura and a collapsed lung, which never recov-

ered. The woman had a similar condition on the other side, and he said he did not have the courage to operate and advised against it, and so in this case I did not advise operation until it became imperative.

My next case was a girl of sixteen years of age, and the cervical rib was on the left side. It was discovered by the dressmaker, and she came because of the swelling; but no other symptoms.

My next case was a girl, twenty years of age, who had this condition on both sides, and was urged to have something done because of what the dressmaker said about the enlargement of the lower part of her neck.

None of these cases have been operated on to date. The girl fourteen years of age still has occasional attacks of brachial neuralgia, and that seems to be the extent of her trouble. After Dr. Senn pronounced against operation I did not have, and have not had, the courage to urge operation without some definite symptoms in the way of distress. These cases have all occurred in the daughters of wealthy people. The woman twenty years of age I saw within a few weeks, and she had absolutely no trouble.

I have beautiful skiagraphs of all these three cases.

DR. L. L. McARTHUR (Chicago, Ill.): I would like to call attention to the fact that not all of these cases of cervical rib produce symptoms attended by pain. It was my privilege to see a case of double cervical rib producing atrophy of the muscles of the hand and double drop-wrist, but unaccompanied by pain. Being familiar with the fact that not all cases operated on are relieved by the operation, I stated the facts to her, but not being assured that she would get relief from an operation, she refused it.

DR. A. F. JONES (Omaha, Neb.): I have a case of cervical rib of a young woman, twenty-one years of age, and I desire to place the same upon record; she had a swelling in the left side of the neck, which was tender and hard and had been diagnosed as sarcoma of the lower cervical vertebra. A skiagram showed a cervical rib. She had no symptoms that were referable to the hand or arm. She felt well in every respect, although there was pronounced and decided tenderness over the rib, the point of which could be seen pressing underneath the skin. On account of the tenderness and the pain it gave her it was decided to remove the rib. We cut down upon it, and found running over it what we

thought was the common carotid artery. In compressing it, the radial pulse disappeared, showing that it was the subclavian, which rose up over the rib and above it about three-quarters of an inch and then dipped downward and outward beneath the clavicle.

I report this case to call attention to the anomalous course of the subclavian artery on the left side in the presence of a cervical rib.

DR. HARRY M. SHERMAN (San Francisco, Cal.): I would like to say a few words with reference to the persistence or recurrence of pain in these cases. A woman in the thirties complained of pain in the arm. Cervical rib was suspected on account of the character of the pain. It could be felt, and a skiagraph showed its presence. It was removed without any trouble, and all symptoms of disability disappeared. She returned to her home somewhere in the South. A few months later she came back, stating that the pain had recurred, and on examination I found no change whatever in the condition of her neck from what it had been when she left me. She was pregnant and returned to San Francisco to have her confinement in the home of her mother.

I report this case with reluctance because the baby has not yet been born, and I wanted to see especially whether the pain disappeared again after pregnancy; that is, if there was some condition of the nerves left after the removal of the rib which predisposed these patients to have pain symptoms whenever a special strain was put on the individual, and I think that is all the more likely from Dr. Plummer's report of the slow recovery of the patients whose cases he related to us.

DR. PLUMMER (closing the discussion): In his article Dr. Keen says that probably only between ten and fifteen per cent of these cases of cervical rib produce any symptoms whatever and of those which produce symptoms not all need to be operated upon. I should not think any of Dr. Percy's cases demanded operation. In the two cases I had the right arm was useless and life made miserable by the pain which was called forth on the slightest exertion. The first patient practically recovered as far as the symptom of pain was concerned. So far as the muscular symptoms are concerned I do not believe that much can be hoped for. I do not believe these patients are likely to improve so far as the atrophy and weakness are concerned.

Dr. Jonas mentioned anomalies of the subclavian artery. I mentioned that in my second case. These are common according to Dr. Keen. The structures go up higher than normal in the neck in these cases of cervical rib. The pleura extends up higher in these than in other cases and the subclavian artery is likely to be high and take a course downward which is almost vertical. I thought in my case this was the carotid artery and only by making pressure did I thoroughly identify it as the subclavian.

HERNIA: WHAT CONSTITUTES A PREDISPOSITION?

AUGUST F. JONAS, M. D.

OMAHA, NEBRASKA

It may seem superfluous to discuss before an assemblage of surgeons a question that appears so self-evident as that of a so-called predisposition to inguinal hernia.

Physicians and surgeons use this expression so frequently among themselves that they often inform their patients that, while no hernia is present, they are predisposed to have a hernia. When we inquire among our fellow-practitioners as to what, in their opinion, constitutes a predisposition to hernia, we find that the definitions are as numerous as the practitioners that have been interrogated. When we consult authors who have written on this question we find as wide a difference of opinion as among our own circle of colleagues. It might be of interest to make clear, if possible, to ourselves, what is meant by a predisposition to inguinal hernia, and, if a predisposition does exist, what are its clinical features.

Koenig, in his well-known text-book, speaks of a hernial predisposition (*Bruchanlage*) which he describes to be a local weakness of the abdominal wall in the region of the inguinal canal, and it is indicated by a bulging in this region with every expiratory movement. Often there is a pathological widening of the outer inguinal ring. In another place he speaks of a

predisposition to hernia dependent on a non-closure of the vaginal process.

Liniger-Bonn (Monatschrift f. Unfallsheilkunde, 1905) calls attention to the following points which constitute a predisposition to hernia: 1. The inguinal canal must easily admit the entrance of the index finger. 2. The canal must be abnormally short. 3. The canal walls must be attenuated.

He distinguishes between strong and moderate predisposition: in the first the inguinal canal is wide, admitting two or more fingers; by the latter a diagonal canal, which admits one finger freely. He seems to attach the greatest importance to the size of the canal.

Thiem occupies himself with the idea of a non-closure of the processus vaginalis and believes this to be a predisposing factor in all inguinal hernias occurring in youth (Handbuch der Unfallkrankungen, 1898).

Kaufmann designates an anatomical predisposition in a preformed empty hernial sac, which he seemingly identifies with a non-closure of the vaginal process. He calls attention to the external findings, namely, the widening of the external canal and the reduced resistance of anterior wall of the canal. (Handbuch der Unfallverletzungen, 1897.)

Becker believes that a weakness of the inguinal canal, an open vaginal process, and the preformed hernial sac constitute a predisposition. (Lehrbuch der Arztlichen Sachverständigen-Tätigkeit, 1895.)

Blasius insists that an inguinal hernia is always congenital, and that a congenital hernial sac always exists in an open vaginal process. The development of the hernia (Bruchfullung) is always acquired by a gradual distension of the vaginal process. He denies that a hernia develops suddenly after a traumatism. (Langenbecks Archiv Bd. 14, 1872.)

Graser is of the opinion that, first of all, there ex-

ists an open vaginal process or a small upper infundibulum; an abnormal width and a minimum obliquity of the inguinal canal. The latter condition may be brought about by exhausting disease, loss of adipose, or advanced age. Besides a wide inguinal canal, he calls attention to a weak inguinal region (*Weiche Leiste*), shown by a slight bulging of the abdominal walls parallel with Poupart's ligament, which becomes very marked by intra-abdominal pressure. He believes that the mobility of the peritoneum on the inner abdominal walls is increased. He further thinks that we may accept a relaxed, possibly loop-holed, and not altogether firm musculature, which, when subjected to intra-abdominal pressure, may increase already existing loop-holes, permitting the peritoneum to crowd into them. He further calls attention to muscular relaxations affecting the lower abdominal region in older people, known as the *dreihügliger Bauch*.

Graser distinguishes sharply between a weak groin and a "pointe de hernie," first mentioned by Malgaigne and later by Kocher as a predisposition of hernia. Graser and Kocher described a globular distension in the inguinal canal, caused by coughing and pressure, which always disappeared when pressure was removed. The seat of this bulging corresponded to the site of the internal ring, leading gradually to a distension of the peritoneum into the inguinal canal and the development of a hernia extending beyond the external ring. (*Lehre von den Hernien*. Bruns I. Bergmann, 1907 III aufl.)

Bilfinger, who has occupied himself with so-called traumatic hernia, states, in his article (*Zur Frage der Entstehung der traumatischen Hernien*. *Langenbecks Archiv*, Bd. 64, p. 159): It could not be shown that there existed a predisposition to hernia in any form, therefore no latent hernia, no empty hernial sac. He

does, however, admit in another place that a predisposition may exist.

Galín (Langenbecks Archiv. 1900, Bd. 60), who considers this "pointe de hernie" as important, alludes to certain individual differences in the construction of the inguinal canal. He refers especially to greater or smaller developments of muscle-fibre groups, which extend along the free border of the internal oblique muscle creating a space, which differs in form and size, according to the direction of the internal oblique muscle, forming a so-called inguinal interspace. (Leisten zwischenraum.) It must be conceded that a defective development or absence of these muscle-fibre bundles removes the only muscular support of the so-called posterior wall of the inguinal canal; and if we add to this an attenuated transversalis fascia and a wide inguinal interspace, the development of hernia is favored. This condition, after a most careful clinical examination, cannot be recognized.

Murray, of London, insists that the open vaginal process in itself is not so important as the form of it at the internal ring, the influence of the internal ring, especially the internal oblique and transverse muscles acting like a sphincter. The larger the entrance to the process, the weaker the supporting musculature and the greater the tendency to hernia. Murray, by way of comparison, calls attention to certain animals in which the inguinal canal during life is large enough, so that the testicle can pass periodically from the abdominal cavity into the scrotum, and yet no hernia develops. Further, stallions are often used as draught horses in which hernia is not infrequent, while in geldings, in spite of severe and prolonged work, hernia is rare. Habits and occupation do not seem to influence hernial formation, nor does the width of the inguinal canal seem as important as the presence of an open

vaginal process. ("Hernia: Its Cause and Treatment," London, 1908.)

Niebergall, whose opinion is based on cadaver dissections, finds a variable closure of the internal ring. The fascia transversalis is often not directly adherent to the spermatic cord, but extends slightly downward before becoming attached to the vaginal process, forming an infundibulum. In such a case, should the vaginal process not be closed, the tendency to hernia exists, and a further predisposition is found in a flat, but, under severe strain, gradually deepening outer fossa inguinalis. He believes that the best protection against hernia is a firm connective-tissue union between the spermatic cord and surrounding structures. (Zur Frage der Bruchanlage. Deutsche militärärztliche Zeitschr., 1900.)

Bramann points to an incomplete descent of the testicle where the vaginal process remains open, and to its analog in the female, an open canal of Nuck and an incomplete descent of the ovary, as a predisposing factor. (Langenbecks Archiv, Bd. 40, p. 137.)

General-Surgeon Dr. Hecker, Hanover, from a military standpoint, defines a predisposition of hernia to be a widening of the outer inguinal canal and a bulging of an attenuated abdominal wall in the region of the inguinal canal, especially if it becomes more prominent on coughing.

In subjecting the foregoing to a critical review, we are, first of all, attracted to a point which nearly all authors take into account, namely, the open vaginal process. It is now generally conceded that the vaginal process is open in from 30 to 40 per cent up to the age of four months. If we take into account the relatively limited power of the inguinal muscles, the frequent use of the abdominal pressure, as found in boys with phymosis, and other disturbances, one can understand how, under such influences, the entrance to the vaginal

process becomes larger and abdominal contents enter the process. And when we take into account that the canal of Nuck is open in from 8 to 10 per cent of the new-born, and that in females hernia is very rare, we must admit that an open vaginal process in children is an etiological factor; and when we note, further, that, according to Sachs, after the age of four months, the entirely open vaginal process has become reduced to 4 per cent, but a partially open process, especially at its upper end, is still found in 29 per cent, this theory is very much strengthened.

Waldeyer attaches less importance to an open vaginal process, but he describes a similiar, if not identical, condition about as follows: He is of the opinion that in all cases of hernia there exists a predisposition, which does not disappear as it normally should, continues not only to exist but to increase, and consists in an abnormally wide inguinal canal forming in it a peritoneal diverticulum, which becomes deeper and sinks gradually into the canal, creating a predisposition. In such cases abdominal pressure, when severe or long continued, causes a hernia.

It is interesting, however, to note that out of 100 cases with similar anatomical and mechanical conditions only 3 or 4 acquire a hernia. Consequently, while an open inguinal process seems to favor the development of oblique inguinal hernia, many cases escape entirely, probably because an open vaginal process is only one of the etiological factors. Certain other conditions, like posture and pressure from above in a certain direction, are necessary.

While this condition, the non-obliterated vaginal process, is so common, and is regarded as a predisposition to hernia, we are absolutely unable, from any clinical examination, to establish its existence. While at the operation we are able to point out a completely open or a partially closed process of congenital origin,

and certain peculiarities of the sac, fusion with superficial layers and irregularities in the spermatic cord, and a defective cremaster muscle, yet we have no clinical signs of importance. Bayer and Carmichael have laid great stress on a strongly developed cremaster layer, a thickened spermatic cord, distended spermatic vessels, and varying turgescence of the skin as pointing to an open process. The writer has found these signs to be of little diagnostic aid, especially when occurring on both sides. All authors admit that an open vaginal process does not necessarily lead to hernia. There have been recorded cases where there existed, besides an open vaginal process, a peritoneal diverticulum, which, in reality, was acquired, consequently we cannot entirely deny the existence of acquired inguinal hernia; therefore, we must conclude that an open vaginal process constitutes an anatomical predisposition in a very large proportion of cases, but does not of necessity explain the occurrence of all inguinal hernias.

We must come to the same conclusion regarding the muscular structures of the inguinal canal.

We can scarcely form prognostic conclusions from a rather wide inguinal interspace, where we find a very oblique course of the oblique muscle and a high attachment of it, and where the inguinal canal seems more yielding than usual; and, further, in cases where the entire inguinal musculature seems relaxed and yields easily by intra abdominal pressure. We must admit that we frequently see persons in whom there exists an extremely lax abdominal wall without the slightest evidence of inguinal hernia. On the other hand, we have many instances in men of advancing age where muscular and fascial resistance becomes reduced, and where hernia, especially direct hernia, develops.

A wide external ring is frequently regarded as a

predisposing factor. It is not difficult to understand that abdominal contents subjected to pressure on the walls can more easily pass through a large inguinal canal than through a narrow one, especially when we take into account, in the latter form, that the posterior and anterior canal walls are pressed together, and that the more intensive the internal pressure the more complete is the closure. Every practitioner of medicine and surgery knows, however, that a hernia does not follow in every wide external ring. The writer has observed many such cases that would admit two and three finger-tips, and yet no hernia existed. These individuals often performed the hardest manual labor, and in two or three instances we have seen a hernia develop on the side where there existed a narrower canal. Consequently we cannot agree with those who declare that a predisposition exists in all cases where the end of the index finger can be passed through the external ring.

In similar manner must we consider those cases where the entire inguinal canal is large. While a large and straight inguinal canal, anatomically considered, seems to predispose to hernia more than a longer and oblique one, still a hernia need not of necessity follow. The author can recall a number of instances of a short, direct, and wide canal with no trace of hernia; and, again, in recent cases there was sometimes found a very oblique canal. Therefore, we can offer no prognostications in the presence of a wide and direct canal. Perhaps the firm connective-tissue growth between cord and canal walls are of greater importance, but it is undoubtedly a condition that we cannot ascertain by external examination.

When we consider the *dreihugliger Bauch* (an abdomen with three eminences), and a soft or weak groin (*weiche Leiste*) of Graser, and the *point de hernia* of Malgaigne and Kocher, and the *Hernia de*

faiblesse of Berger, which have been designated as especial points of predisposition, we know that hernia does develop sometimes in all of these, but just as frequently no trace of rupture ever appears. It is in this class of cases that traumatism is said to play such an important rôle. In these cases no impulse can be made out with the index-finger in the inguinal canal while coughing, and if we accept the assertions of Krönlein and Blasius, who deny a sudden traumatic development of hernia, we must admit that the predisposition, in the above condition, is not great. These authors believe only those can acquire a hernia traumatically in whom a hernia already exists, that is, in whom a hernia that has already begun. Haegler points out that a small loop of intestine may have entered the internal ring while the individual is standing and recedes usually, but not always, when lying down. While this has been designated as a predisposition, it is claimed that it should be regarded as a beginning hernia. Personally, I am inclined to the opinion that a hernia really exists from the moment when there is a tendency for an intestinal loop, however small, to rest temporarily in the entrance of the inguinal canal. Now, while this condition cannot often be recognized clinically, there is no doubt of its existence. A sudden traumatism in the presence of a weak groin might be, and probably is, ineffectual, unless there is a vaginal process that is open at its upper end and will admit an intestinal loop into the internal ring. No doubt, such a condition might gradually lead to a hernia. There has been a preparatory stage, if you please, that has existed for a considerable period preceding the appearance of the hernia at the external inguinal ring. This preparatory stage has consisted in a widening of the open vaginal process, a preformed sac, if you like, a stretching of the fibrinous structures between the cord and the canal walls,—a widening of the inguinal

interspace by a crowding inward of the internal oblique and transversalis muscles. During this stage an intestinal loop is forced down only occasionally and has no prolonged resting-place in the canal. On examination the canal is empty, hence there is no clinical evidence, except possibly a wide canal. Then, after or during an unusual exertion a loop descends with great force, stretching the sac and canal until it becomes so large that an intestinal loop finds in it temporary or prolonged residence, and a hernia is said to have formed after a sudden and severe exertion. But from the foregoing and our observations in practice and a consideration of the nature of fibrous structures composing the peritoneum, external, and internal rings, cord, etc., it is questionable whether a hernia can form suddenly, for it would seem that the structures would tear rather than yield suddenly. Consequently we must assume a preparatory stage. There might be a wide difference of opinion as to whether this preparatory stage constitutes a predisposition, or whether a hernia has already begun. It does seem that we are not justified in speaking of a predisposition when a hernial sac already exists, however small, for an open vaginal process is in reality a hernial sac, perhaps too small to accommodate an intestinal loop for any length of time, but repeated impulses gradually widen the same so that intestine and omentum find a prolonged resting-place.

If we now attempt, briefly, to formulate the conditions that may constitute a *predisposition to hernia*, we find that we must consider them from an anatomical and clinical standpoint.

1. All conclusions as to predisposition to hernia that are based on the direction and size of the inguinal canal, a large external ring, are untrustworthy.
2. All opinions as to predisposition based on the vague ideas of muscular weakness, reduced abdominal

resistance, and diminished support of connective-tissue structures, are unreliable.

3. Retarded descent or undescended testicle favor a complete or partially non-obliteration of the vaginal process.

4. A partial or a completely non-obliterated vaginal process may be regarded as an anatomical predisposition to oblique inguinal hernia.

5. The non-closure of the vaginal process cannot be recognized clinically.

6. It would seem that we are scarcely justified in using the term *predisposition to hernia* because of the lack of reliable clinical data.

FOR DISCUSSION SEE PAGE 178

THE FREQUENCY OF CONGENITAL SACS IN OBLIQUE INGUINAL HERNIA

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Although Camper, in 1762, and Wrisberg, in 1779, made dissections and called attention to the fact that inguinal hernias were due to a persistence of a patent processus vaginalis, the impression continued to prevail, even up to modern times, that a hernia was of necessity the result of some sort of violence, with tearing or rupture of tissues.

A close study of this region at operation, and the examination of the sacs in situ and after removal, forces upon one the conviction that many of these cases are of congenital origin. This is not infrequently borne out by the clinical history. How else can we explain the case of a previously sound man who, after lifting a heavy load, suddenly acquires a bulging in the groin? How do we account for the different types of sac formation to be detailed later?

An understanding of the development and closure of the tunica vaginalis is essential, and explains the different varieties of sac formation.

MIGRATION OF THE TESTICLE

During early fetal life the testicle is an abdominal organ and lies in the region of the kidney. It is surrounded by peritoneum, which forms, posteriorly, a sort of mesentery or mesorchium, through which the

vessels and nerves reach the organ. To its lower extremity there is attached a musculo-fibrous band, called the gubernaculum testis hunteri. This passes through the inguinal canal and is attached to the bottom of the scrotum. The testis in its descent reaches the internal ring about the seventh month. At this time a small indentation of peritoneum has formed at the spot where the gubernaculum leaves the abdomen. This is the beginning of the tunica vaginalis, and the same factor which causes the descent of the testicle operates in elongating the peritoneal process. The latter pushes through the inguinal canal into the scrotum, carrying in front of it the subperitoneal tissue, the infundibuliform process of the fascia transversalis, some fibres of the internal oblique muscle, which form the cremaster, and the intercolumnar fascia. At the same time the testicle passes into the scrotum, which it reaches shortly before birth. *The peritoneal diverticulum, or incipient tunica vaginalis, is present before the testis begins to traverse the abdominal wall; hence the vaginal process cannot be considered the result of a bulging of the peritoneum caused by the testicle. On the contrary, the testicle and vaginal process are united, and descend together, and if the agent ceases to exert traction the descent is arrested. The gubernaculum may even cause a diverticulum of the peritoneum, and leave the testicle within the abdomen. The right testicle is later in its descent than the left.*

The peritoneal sac, which preceded the testicle, is at first continuous with the general peritoneal cavity, but soon after birth it becomes obliterated. According to Sachs the obliteration is accomplished ten to twenty days after birth.

There are three points with reference to the vaginal process at which there is the greatest tendency to constriction and obliteration, viz.: first, at the internal ring; second, at the external ring; and, third, a point

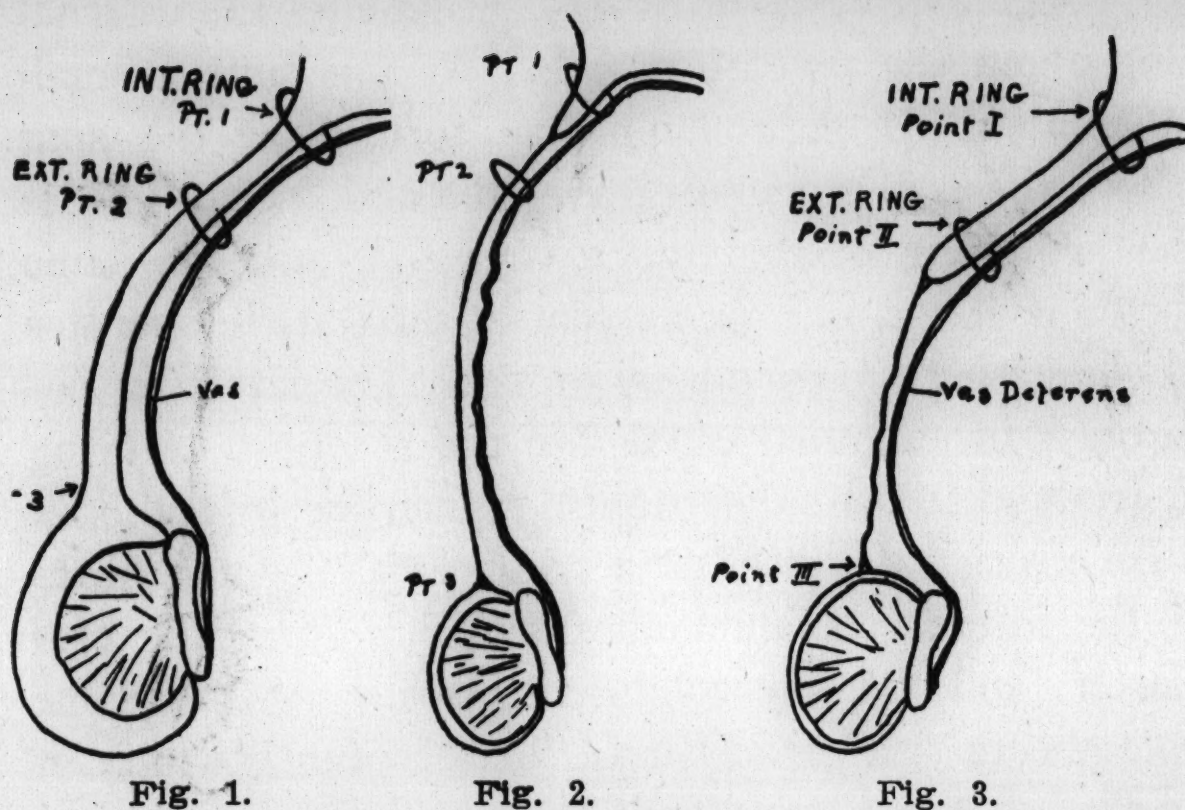


Fig. 1.

Fig. 2.

Fig. 3.

Fig. 1. The vaginal process is represented as being completely open and continuous with the peritoneal cavity. The internal and external rings are represented by ovals. The three points where obliteration of the vaginal process is said to begin most actively are indicated at points 1, 2 and 3, respectively. This case is one of "congenital hernia," employing the old nomenclature. The vaginal process has made no effort at all at closure.

Fig. 2. The vaginal process has almost completely closed, only a small infundibuliform process remaining, from the apex of which a fibrous cord (the obliterated tunica vaginalis) could be traced down to the testicle. Clinically there was a widened inguinal canal with some impulse on coughing.

(Weiche Leiste, of the Germans.)

Fig. 3. This patient had a large direct hernia, and on the same side there was a potential oblique sac. The latter was very thin and glove-finger-like, and about the diameter of an ordinary pencil. It extended slightly beyond the external ring, was empty, and had evidently never been occupied by either bowel or omentum. From the fundus a band was traced down to the testicle. Obliteration of the vaginal process had been completed from point 2 downward, but remained open above.

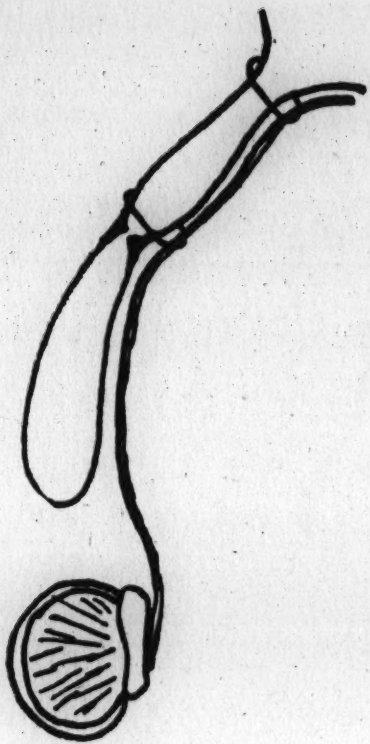


Fig. 4.

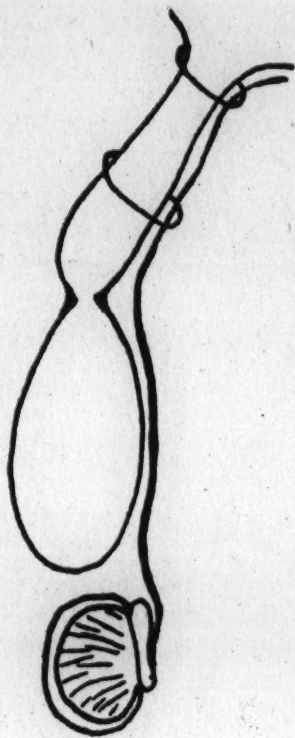


Fig. 5.

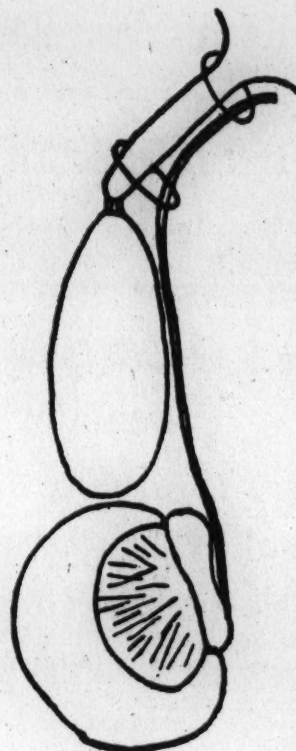


Fig. 6.

Fig. 4. A case in which the sac presented a thick annular constriction, corresponding with the external ring. At this point strangulation of the contained omentum had occurred. In this case closure of the process had been completed above the testicle, and the constriction at the external ring shows the effort at closure at that typical point. In large hernias this constriction has usually been carried down into the scrotum.

Fig. 5. A case similar to case 4, with the point of constriction displaced into the scrotum, forming an hour-glass sac.

Fig. 6. A case with a small glove-finger-like sac containing omentum. To the fundus, which corresponded in location to the external ring, there was attached by a fibrous band a sausage-shaped sac filled with serous fluid. This hydrocele was intimately connected with the vas and vessels. There was also a small hydrocele of the tunica vaginalis testis, but no organic connection existed between the two hydrocele sacs. The explanation of these findings is that obliteration occurred at points two and three, but the intervening portion of the tunica did not close, forming the two distinct sacs and the hernial sac above.

just above the testicle. The vaginal process first begins to close at or below the external ring, and more rapidly in a downward direction than upward. Normally, therefore, by the end of the first month of life the vaginal process has been obliterated from the internal ring to the testicle, leaving only the tunica vaginalis testis. Evidences of the obliterated tunica in the shape of fibrous cords have been found in dissections, extending from the internal ring to the testicle.

Various theories have been offered to explain the closure of the vaginal process. Camper suggests it is the growth and development of the pelvis. Bell says it is a local irritation and contraction due to the passage of the testicle. Heoin believes the cause to be a local muscular contraction. Broca draws an analogy with monkeys from the fact that in the case of monkeys that walk upright the vaginal process closes similarly to that of man, while in those that walk mostly on all fours the process remains open.

The normal migration of the testicle and closure of the vaginal process having been considered, we now turn to the cases of faulty and incomplete closure for an explanation of the different kinds of sacs which we find at operation.

That incomplete closure of the vaginal process is by no means uncommon is shown by the following statistics:

Vaginal process open on both sides.....	20 times.
Vaginal process open on right side.....	12 times.
Vaginal process open on left side.....	5 times.
Camper—70 infants.	
Vaginal process open on both sides.....	34 times.
Vaginal process open on right side.....	14 times.
Vaginal process open on left side.....	8 times.
Fere—146 dissections of infants up to eighteen months.	
Complete closure both sides.....	84 times.
Incomplete closure both sides.....	33 times.
Both sides entirely open.....	8 times.

Open on one side only.....10 times.
Sachs—155 infants.

Complete closure both sides.....47 times.

Open on left side..... 8 times.

Open on right side.....32 times.

Open on both sides.....26 times.

Crickx—32 infants up to two years of age.

Open on both sides.....13 times.

Obliterated on both sides.....16 times.

Open on right side..... 4 times.

From these anatomical studies it would appear that the vaginal process on the right side remains open or unobliterated, in some degree, twice as often as on the left side. This bears a significant resemblance to the preponderance of right oblique hernias. Finally, in over one-third of all these infants dissected, some defect of closure of the vaginal process was found.

We shall now seek to show how the various deviations from the normal closure of the vaginal process tend to explain some of the different types of oblique hernial sacs, which we find clinically at operation. The schematic figures here reproduced are made from actual cases in the author's practice.

How can a hernial sac at operation be recognized as of congenital origin? Has a congenital sac any characteristic features? While it is not possible in many cases to make a positive diagnosis, yet the following points are of value in making a decision:

1. Glove-finger-like and narrow sac, generally empty.
2. Thin wall.
3. Absence of subserous fat.
4. Trabeculated structure.
5. Annular constrictions, which oftentimes still correspond with the internal or external ring. Frequently the constriction has been displaced beyond the ring.
6. Thickening of fundus.

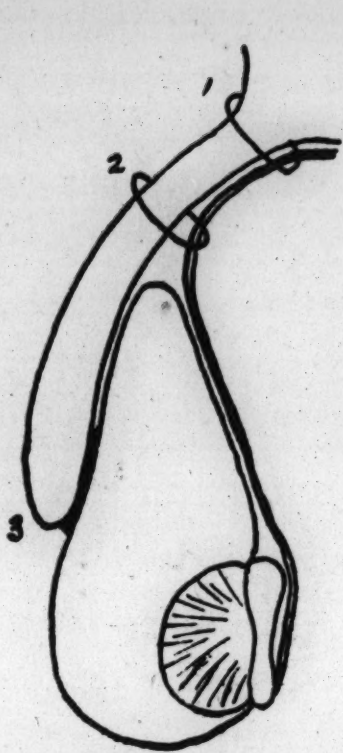


Fig. 7.

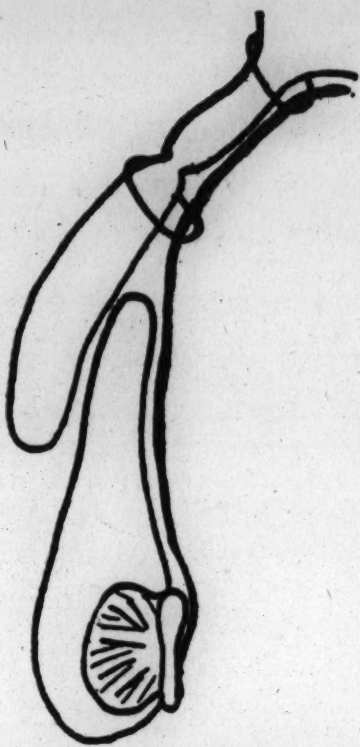


Fig. 8.

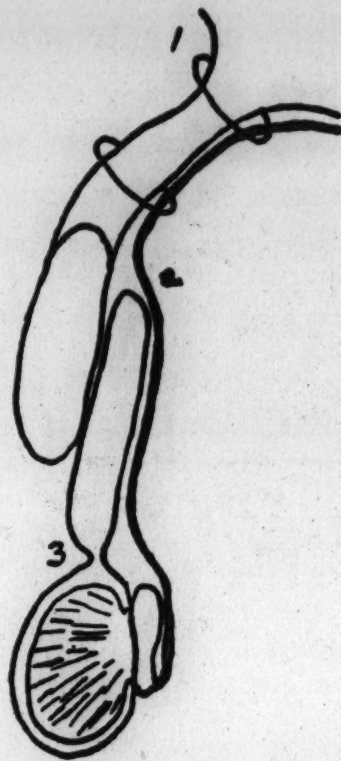


Fig. 9.

Fig. 7. A case in which there was found a moderately large hydrocele of the tunica vaginalis testis, in addition to a hernial sac, which was narrow and thin, overlapping the hydrocele, and adherent to same. In this instance the constriction took place at point three, and the sac remained entirely open above. Subsequently the hydrocele developed, growing in an upward direction and overlapping the sac.

Fig. 8. A case somewhat similar to Fig. 7, except that the sac shows a constriction slightly above the external ring. The fundus of the hernial sac and the small hydrocele of the tunica vaginalis testis were adherent and overlapping.

Fig. 9. A case in which there was a hernial sac, the distal portion of which was partitioned off and contained serous fluid. Extending upwards from the tunica vaginalis testis and communicating with the same by a small opening, was a sac closely adherent to and extending almost to the external inguinal ring. This latter funicular sac and the lower part of the hernial sac were overlapping and adherent. In explanation it is suggested that originally, before the hernia developed downward, these sacs were in contact, but not overlapping. At point two the vaginal process might easily have become constricted at two places, leaving a separate chamber in the fundus of what later became a hernial sac. The funicular portion of the vaginal process remained open from point two downward, making some attempt at closure at point three above the testicle.

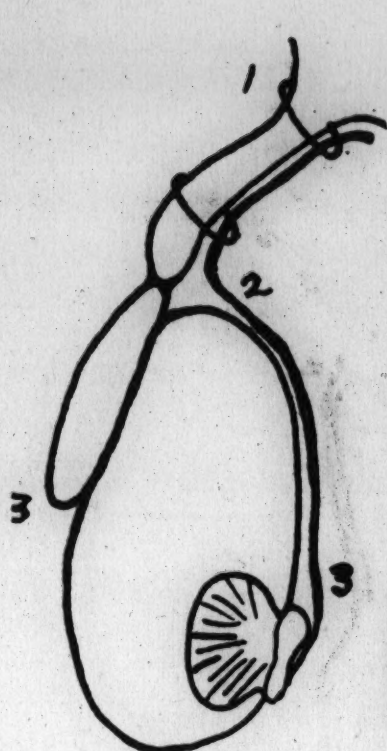


Fig. 10.

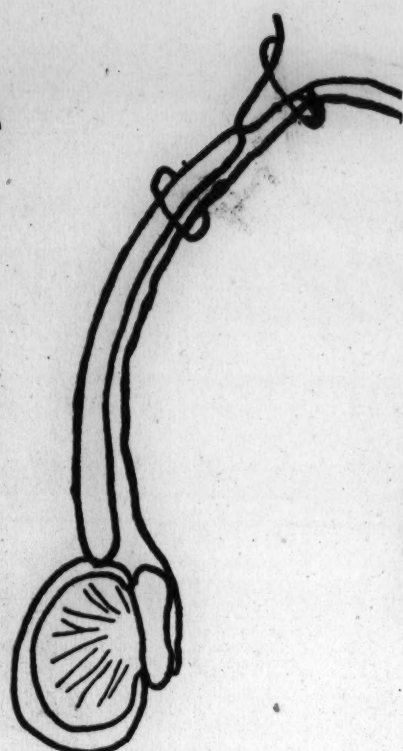


Fig. 11.

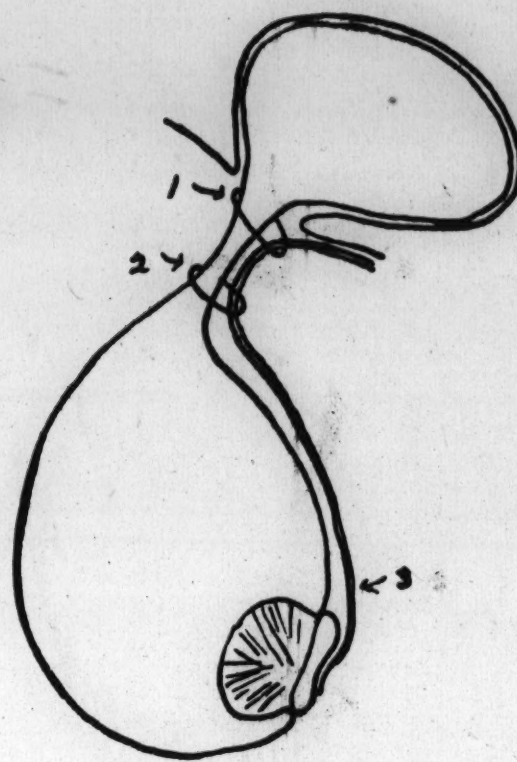


Fig. 12.

Fig. 10. A case very similar in its origin to Case 9. There was a hernial sac extending slightly beyond the external ring. To the fundus was attached a thin elongated serous sac containing fluid. There was a large hydrocele of the testicle extending upward and closely related to the vas and vessels. The two serous sacs were overlapping and adherent. This case might be explained in two ways: First, that conditions were as in Case 10, which it resembles very closely, save that there was no constriction at point three; second, that the case early was like Case 7, only that the hydrocele of the tunica vaginalis testis became relatively much larger, and as it grew upward, overlapped the other serous sac.

Fig. 11. In this case there was a closure of the tunica vaginalis at the internal ring and at a point above the testicle. The intervening portion remained open and contained a small amount of fluid. The malformation was noticed since birth, and the patient, a boy of twelve years, was supposed to have a hernia. The case was one of funicular hydrocele, although there was a small hernial sac present. The lower end of the hydrocele was blended with the tunica vaginalis testis. The former was intimately adherent to the vas and vessels.

Fig. 12. A case of large bilocular or hour-glass hydrocele, which simulated a hernia in that it was reducible into the abdomen, and gave an impulse on coughing. The scrotal portion of the hydrocele communicated with the abdominal (sub-peritoneal) portion by means of a constricting neck in the inguinal canal. This communication was the size of the index finger. In a case such as this it can be assumed that the vaginal process closed at point one, the internal ring. The entire lower portion remained patent, and in time fluid collected in the sac. As the fluid increased in amount, the inguinal canal was gradually distended, as with a colpeurynter, and afterward the sac bulged into the peritoneal cavity, but under the peritoneum. Eventually the hour-glass formation was complete. How else could a hydrocele force its way into the inguinal canal, unless there was already a membrane extending into the canal?

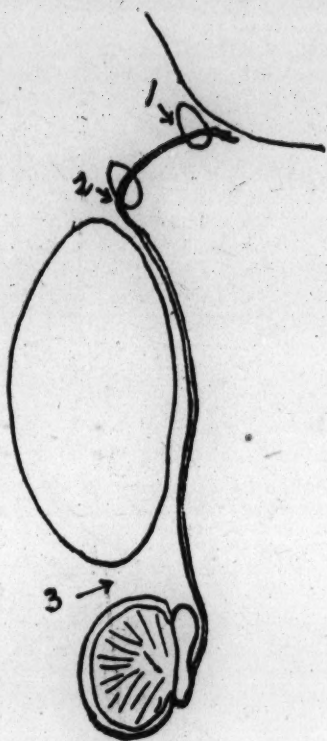


Fig. 13.



Fig. 14.

Fig. 13. This case was one of hydrocele of the cord, or funicular portion of the tunica vaginalis. The explanation is simple. Complete obliteration of the vaginal process took place between points 1 and 2, namely, the portion within the inguinal canal. Constriction also occurred at point 3, the point above the testicle. The remaining portion remained patent, and filled with fluid.

Fig. 14. A case in which there was a thin, narrow, glove-finger-like sac extending slightly beyond the external ring. To the fundus of the sac there was attached a small thin walled cystic body, which contained a small amount of clear fluid. Sac and cyst were closely adherent to the vas. This condition can be explained on the theory that the vaginal process remained open from above to slightly beyond the external ring. The funicular portion obliterated almost completely, leaving only a small portion at its upper end open, and this later filled with fluid.

7. Fibrous process extending downward from the fundus for a variable distance, sometimes attaching to the tunica vaginalis testis.
8. Close relationship of sac to vas deferens and spermatic vessels. The latter may be spread over the sac.
9. Sac still enveloped by fibres of the cremaster muscle.

CONCLUSIONS

1. The chief etiological factor underlying the development of oblique inguinal hernia in fully three-fourths of the cases can be traced to the pre-existence of a congenital sac, the result of faulty closure of a part or the whole of the vaginal process. This proposition has been sustained in the last one hundred operations in the author's practice.

2. Congenital malformation takes a minor part in the causation of oblique hernia, while it plays a most important rôle in the etiology of direct hernias. The malformation is manifested by an underdevelopment of the arching fibres of the internal oblique and transversalis muscles. These muscles do not in these cases join to form a conjoined tendon with insertion into the pubes, but pass directly inward to be inserted into the sheath of the rectus muscle. This leaves a triangular area, bounded above by the above-mentioned muscle fibres, internally by the edge of the rectus, and below by Poupart's ligament. This area is unsupported except by the transversalis fascia and the fascia of the external oblique muscle. This local weakness is the underlying factor in direct hernias, although it has considerable influence in those cases where there is present a preformed sac.

3. The fundamental reason for the existence of so many oblique inguinal hernias being the preformed sac, it follows that at operation one of the most im-

portant steps consists in the proper ablation of the sac. By this is meant a high ligation, seeking to avoid the leaving of an infundibuliform process, which will tend towards a recurrence, no matter what the type of suturing has been. This will insure more permanency than many of the refinements in technic that are being suggested and claimed as essential. Our experience with femoral hernias sustains this view, as shown by the abandonment of the many very complicated operations in favor of a simple one with complete removal of the sac.

DISCUSSION OF THE TWO PRECEDING PAPERS

DR. DANIEL N. EISENDRATH (Chicago, Ill.): I believe that the factors which have been brought out by Drs. Jonas and Hessert are exceedingly important. Our operative technic has advanced to such a state that we can feel, so far as the plastic portion of our operation is concerned, that we have reached pretty nearly perfection with the modern methods.

The point has been brought out by these gentlemen that the majority of hernias are congenital, and that confirms the theory of Murray of Australia, that we have in nearly every case of hernia a so-called preformed sac; and Dr. Hessert has pointed out how many of these cases show different stages of development of the congenital sac. It is exceedingly important, for a good many reasons, to recognize this at operation. In the first place, we have found in our operative work in Chicago that where we have a large number of hernias amongst the foreigners that hernia operations necessarily should be done in the majority of cases upon both sides. We would operate on one side where there would be apparently a well-marked hernia of the congenital type which had almost obliterated itself. We would operate on the other side to see what we could find, and we found a hernial sac, although there was absolutely no clinical sign, and in every case we have been able to demonstrate a sac of the type Dr. Hessert has shown, evidently an old congenital sac which had imperfectly closed.

One point mentioned by Dr. Hessert is of considerable interest clinically, and that is the tendency of a great many of these congenital sacs to form hydroceles,—not only hydroceles of the cord, but hydrocele of the sac itself. An ex-

cellent way is not to treat them as we have been taught, that is, to ligate the hernial sac high up and take the lower portion and suture it; but, in the majority of cases after ligating the sac high up, to turn the rest of the sac inside out, the object being to prevent the formation of hydrocele.

Another question Dr. Hessert brought up is the relation of the anatomical condition present in the muscles to the development of hernia. In a number of foreigners who have been accustomed to sedentary habits, the internal oblique muscle not only forms a very large area by attaching itself to the upper portion of Poupart's ligament, but it has such thin fibers that, by using it in the Bassini operation and suturing it to the oblique, it is found impossible, and we have adopted the principle of taking the aponeurosis of the external oblique to strengthen the weak internal oblique.

Dr. Hessert brought out another point in reading his paper which is worthy of some consideration, and that is these pantaloons sacs. He has called our attention to the necessity of ligating these sacs high up, in order to avoid a recurrence of the hernia.

DR. THOMAS C. WITHERSPOON (Butte, Montana): About five years ago I became very much interested in the question of the cause of hernia, and I spent two years in the constant dissection of this area, and by means of that dissection I gained some knowledge which I feel to be, at least to me, valuable. I think in the discussions that we have had,—and I take it for granted that Dr. Jonas referred only to oblique inguinal hernia,—that we have laid much stress upon the tunica vaginalis, the small peritoneal process that passes down into the inguinal canal. At the time the testicle makes its descent from the belly into the scrotum, it passes down and carries with it every layer of the abdominal wall in normal relationships. In coming down and bringing these layers, even if there is peritoneal closure, there is no other layer of the wall closed across the internal abdominal opening. In other words, these layers pass down along the canal and surround the testicle. The only membrane crossing the opening is the peritoneum itself. That peritoneum has not the power to resist hernial formation. I have made a small instrument, rather narrower than the ordinary knife-handle and rounder, pass through the canal and without the slightest bit of trouble in every case. Dissecting, I found I had gone through no membrane at all, but had simply made a separation, pass-

ing down along the track of the testicle. From my observations it was evident there was one way to classify hernia: first, to consider hernia as an acute formation; second, as chronic; and, third, as traumatic.

The question of predisposing cause of hernia comes to mind and it seemed to rest upon this: There are two planes, one internal, formed by the conjoined tendon so-called, which is nothing more nor less than the transversalis muscle with a few dense fibers that lie parallel to Cowper's ligament and comes out of the pelvis onto the abdominal wall constituting the non-muscular median protecting structure. The other is the outer, a muscle plane, which overlaps the inner or median plane. Between these planes is the inguinal canal. As soon as that muscle layer is unable to contract sufficiently to hold itself against the inner inactive layer, it will predispose to hernial formation; and from the moment when there is a discrepancy between these two planes or layers, the bowel begins to find its way between them, and we have a hernia. If we have an open peritoneal process a hernia slips down suddenly, and we have an acute hernial formation. If, on the other hand, there is no such process, we have a slow chronic type of hernia. You take, for instance, a man who is sick in bed with fever, and is weak. When he gets up he has a discrepancy in these two planes and readily develops a hernia. Again, take a fellow who is caught off his guard when these muscles do not act at the moment of general abdominal tension. If he has such a process, he develops a hernia. The thing, it seems to me, rests entirely upon the discrepancy between these two planes by incompetent muscle-action.

DR. CHARLES H. MAYO (Rochester, Minn.): When Dr. Eisendrath spoke of pantaloons hernia he reminded me of some accidents I have seen happen. We must be careful in making sure that that is a pantaloons hernia. In working on the second pantaloons I have found that the mucosa of the bladder, the nearer you get to it, looks like peritoneum.

DR. L. L. McARTHUR (Chicago, Ill.): I fear that unless further emphasis be brought to bear upon it, the extreme value of Dr. Jonas' paper will be lost. We should draw the deduction from it that we must be chary indeed to pronounce a case as predisposed to hernia because of the medicolegal aspect which that pronouncement puts on the case and on us. Too many of us are ready on superficial examination to find

this or that patient is "predisposed to hernia," but Dr. Jonas has shown by analysis of the recognized authorities in all parts of the world that no one or two factors that we can assemble will enable us to decide whether a patient is predisposed to hernia without incision or not.

DR. LEONARD FREEMAN (Denver, Col.): I desire to emphasize what Dr. McArthur has said. A prominent surgeon of one of our largest corporations read a paper before the Colorado State Medical Association in which he called attention to the fact that congenital hernial sacs were common; and he also maintained that in case a man who is working for a corporation, through some accident for which the corporation is responsible, develops a hernia, and it could be shown by operation or otherwise that he had a "predisposition" to it, that man should not recover damages from the corporation. Now, that does not seem reasonable to the ordinary individual, because if a man did not have a hernia before, and he went through some accident and a hernia appeared afterward, it does not make much difference to the individual whether he had a congenital sac or not—the *hernia resulted from the accident*, while the presence of a preformed sac is merely theoretical.

DR. JONAS (closing the discussion): In reading my paper rather hurriedly I fear some of the main points which I attempted to make, were lost sight of. As to the clinical recognition of a predisposition to hernia, I may say it is difficult, if not impossible. I have known individuals who have been turned down, on examination, and who sought employment with corporations of one kind and another, that were thought to be predisposed to have hernia, yet the same individuals went to work in other capacities, exerting themselves in a physical manner similar to what they would have done had they taken up the work for which they were examined, and yet they developed no hernia. I have seen men working in whose cases I could introduce three fingers in the inguinal canal, and yet they never had a hernia. I have seen individuals with a wide canal on one side and a narrow one on the other, and yet they developed a hernia on the narrow side.

Are we able to recognize a predisposition to hernia by any signs and symptoms, to tell positively that a man is predisposed to hernia? In my own mind I must confess I am not able to state positively, in the majority of cases or even in

a small number of cases, whether a man is predisposed to hernia or not. Anatomically, we have a great many things which seem to predispose to hernia, but, clinically, we are not able to recognize them.

SOME ANOMALIES OF THE SIGMOID

LEWIS L. McARTHUR, M. D.

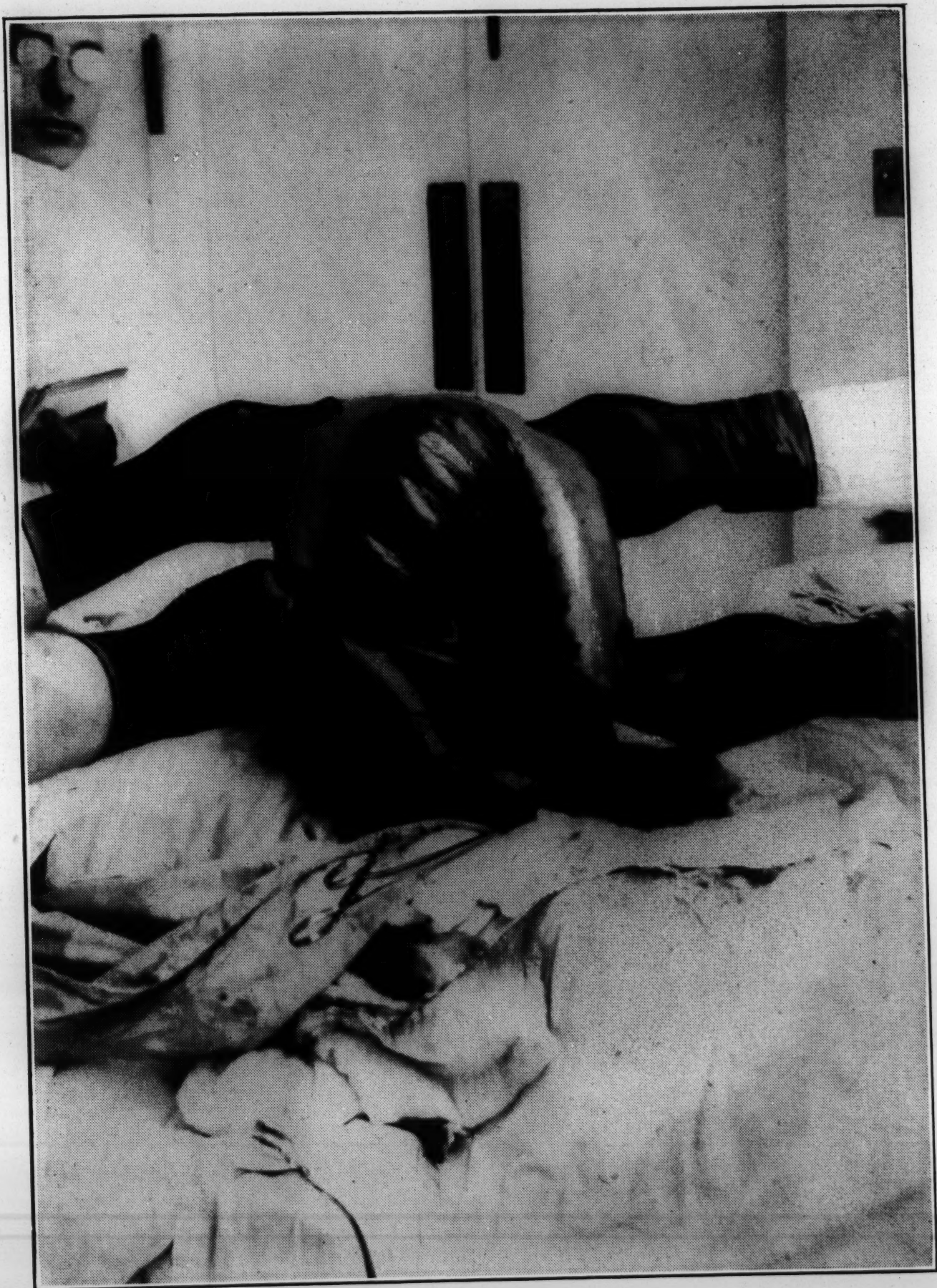
CHICAGO, ILLINOIS

Those of us receiving our instruction in abdominal surgery twenty or more years ago, were given but very meagre data as to the variability in size, position, and mobility of the intestinal segments. Even at the present day the surgical profession is only beginning to realize and to incorporate in their text-books those departures from the very beautiful, but more or less diagrammatic, forms which the older anatomists portrayed as the findings to be awaited on opening the abdomen. The era of operative surgery has made it possible to revise those findings, hampered, however, by the early teachings and schematic plates formerly offered for visualizing by the beginner. Hence it has taken years of celiotomies before the operator dared to correct the teaching that the stomach lay transversely in the abdomen, and, similarly, to realize that the sigmoid is not a constant letter S, nor does it occupy the position to which we have been taught mentally to assign it. It is therefore for the purpose of emphasizing some of the vagaries as to the size and position of this segment of the bowel and the potential sequelæ that I ask your indulgence, since their importance has been forced upon us by the desperate surgical situations which they have induced. Our anatomical knowledge, in other words, has had to be relearned from rude experiences on the surgicopath-

ological side instead of normal anatomy. Until it became possible to recognize them, by opening the abdomen during the existence of the surgical lesions thereby provoked, there existed no reasons why special emphasis should be placed upon the short fixed beginning and ending of the sigmoid segment. Yet upon this anatomical fact, that the lower end of the descending colon and the distal end of the sigmoid have a short and rather fixed mesocolon while the intervening portion is relatively free, depends much of the pathology of the sigmoidal loop. I have omitted from discussion here, as of quite another type and irrelevant, those congenital malformations known as Hirschsprung's disease, megalocolon, and the like. Indeed the case which determined my selection of this topic is now convalescing from an operation made necessary by these fixed attachments.

With the attention directed to the mode of attachment at the points above mentioned one will often be surprised, on inspecting them, first, at the limitation of motion; secondly, at the ease with which angulation by traction or malposition can be induced in the sigmoid, either at its proximal or distal end, or both; thirdly, how readily these attachments, especially when close together, lend themselves to the formation of a volvulus with a partial or complete occlusion of the bowel lumen.

Another factor, probably incident to the requirements of civilization, is the gradual conversion of this segment of the bowel into a temporary cloaca for fecal matter until a convenient time for its emptying. This implies both a gradual dilatation and an increased weight. This, in turn, means a dragging on or torsion of the mesosigmoid, producing the chronic mesosigmoiditis, carefully described by Reis, with the thickening and scar-tissue formation he so emphasizes as found at that point; or the angulation of Delatour and La-



roque, with the acute intestinal obstruction, the cause of which the operator may so easily overlook. In lifting the prolapsed sigmoid, for example, from the pelvis, in search for obstruction below, he not infrequently will relieve the angulation (Delaunoy) while failing to find any obvious obstruction; or, thoughtlessly in his search, correct a rotation of 90° in the sigmoidal loop, thus overlooking a volvulus and reporting his findings as negative. Laroque has reported some very interesting cases in which such slight torsion was quite sufficient to induce total obstruction, and to demonstrate the same at time of operation. Gersuny has called attention to a fibrous band usually to be found between the two points of normal attachment. In the light of these anatomical data, many of the otherwise obscure affections of the sigmoid may receive considerable illumination. Just as recurrent obstructive conditions at the vesical neck in time provoke the formation of the trabeculated bladder with its diverticula, may not similarly induced Graser's diverticula occur in this situation? Some of them at least consist of similar hernial protrusions of the mucosa and submucosa through atria in the muscularis, and all of them are potentially as susceptible to inflammations as the appendix.

Again, the site of origin of most of the neoplasms of the sigmoid are at fixed points at which angulation or torsion could most disturb the nutrition of the mucosa. In illustration of the conditions referred to I desire to present the histories of two striking cases and make comment thereon.

CASE 1. In May, 1909, I was called to Charleston by Dr. Montgomery to operate upon a case of intestinal obstruction of eleven days' duration, occurring in a young woman schoolmistress about 30 years of age whose history was negative, except for chronic constipation. For several days she had had no bowel

movements, in spite of her usual cathartics and colonic flushings. Becoming tympanitic and suffering colicky pains, she consulted her family physician, who, being unsuccessful in relieving her, had her enter Dr. Montgomery's sanitarium.

When seen by me on the eleventh day the patient presented an anxious appearance, with cold clammy extremities, enormously distended abdomen, and had but slight temperature (below 100°); rapid and weak pulse; low leucocyte count (12,000); vomiting, not fecal; abdomen, tympanitic all over; no tumor to be felt, externally or per rectum; vaginal vault and uterus, crowded downwards.

Though the patient was weak, operation was advised. On opening the abdomen, the small and large intestines were both dilated, but the chief dilation existed in an enormous loop wedged in the pelvis. On raising this loop it was seen that it was the sigmoid, that it was sharply flexed at the point of junction with the rectum, and that the relief of its incarceration permitted its contents to pass down into and out of the rectum, with reduction of colonic distention. Fearing that so simple a procedure might not explain so obstinate an obstruction, careful and extensive search was made throughout the abdomen without finding any other cause. The mesosigmoid showed thickening, scar-tissue, and old infiltration anchored the loop of sigmoid posteriorly with its distal and proximal ends unusually close together, and the band of Gersuny very evident. The latter was cut, the very large sigmoidal loop restored to the left abdominal cavity, the small intestines restored to the pelvis, the omentum drawn down over the sigmoid, and the abdomen closed. Recovery was uneventful.

I am in accord with Dr. Clark in not favoring the fixation by suture of such loops to either the anterior or posterior wall, as the potential dangers are almost

equally as great as that of recurrence. Were a similar case to be met with, but not in quite so desperate a condition, I should make a side-to-side anastomosis between the proximal and distal ends before restoring it to the abdomen, just as I have corrected a rectal prolapse by anastomosing the drawn-up rectum to the first portion of the sigmoid.

A few months ago I saw Dr. Arbuthnot Lane remove an entire colon for chronic obstinate constipation, and he commented upon the frequency with which the most refractory cases of constipation were associated with prolapse of the dilated sigmoid, and this while in the act of lifting such a sigmoid from the pelvis!

CASE 2. Young man, M. B.; aged 23; carpenter; admitted to hospital November 8, 1909.

Present trouble is of about one year's duration, beginning with diffuse cramp-like pains in the lower abdomen. These would last from a few minutes to four hours. Usually began one to two hours after meals, and relieved if he secured a stool. Never vomited and never jaundiced. Bowels constipated for years. Neither chills nor fever with attacks. Some loss in weight. No urinary symptoms. During an attack one month ago the patient noted peristaltic waves sweeping from left to right across the abdomen, not always accompanied by pain, but so marked that he came to the hospital and called attention to them.

Past history, negative. Typhoid, 10 years ago. Personal history, negative as to family history. Uses tea, coffee, tobacco, and alcohol in moderation.

General physical examination, negative, with the exception of the abdomen, which is slightly tympanitic; no rigidity or tenderness. Visible and marked peristaltic wave across the upper abdomen, which travels from left to right.

With such a history I examined the case, finding at

the time of first examination absolutely nothing objectively and subjectively, only such as the history of chronic constipation might supply. The peristaltic wave at the time was not visible. In order to do him no injustice, however, careful stomach, urine, stool, and blood analyses were ordered made.

Stomach: Contains about 40 cc. of fluid with yellowish fragments uniformly distributed and containing some mucus.

Acidity: Free HCl—0, total 17.

Blood: Negative to benzidine and Weber.

Lactic acid: Negative.

Microscopically, starch granules, plus, plus. Very few fat globules.

Urine: Color, amber; transparency, slightly turbid; odor, negative; reaction, acid; specific gravity, 1027-1034; sediment, none; mucin, abundant; urea, 31 per cent; albumin, none or very slight.

Deposits: Crystalline, none. At one time numerous oxalates; amorphous, slight; epithelium, very occasional, oval; bacteria, very many.

Stool: Examined for blood, positive to benzidine and Weber.

X-ray of stomach, negative with bismuth test. X-ray with O'Donnell rubber bag, herewith submitted.

After a week's observation these analyses, throwing so little light on the case when submitted, I had decided to discharge him, when the house surgeon notified me during my rounds that "the attack" had reappeared. On examination all findings usually observed with an enormously dilated stomach with obstruction at the pylorus, were to be noted. There was the pronounced peristaltic wave from left to right high up. An exploratory operation was then determined upon and welcomed by the patient.

Operation.—Believing the trouble to be in all probability a dilated stomach, a median incision was

made above the umbilicus. On opening the peritoneum a loop of intestine, enormously dilated, was found running transversely, and, until the incision was enlarged enough to permit examination, it was thought to be the transverse colon. On lifting the loop through the enlarged abdominal wound it became evident that it was the sigmoid. On tracing the same down to its fixed points there were noted transverse bands of adhesions between the proximal and distal ends of the loop. Angulation of the proximal end was easily demonstrable. No apparent obstruction obtained at the junction of the sigmoid with the rectum. The entire colon was normal and of small size, but filled with hardened scybalous masses in all three portions. Resection of the sigmoid was determined upon, and this was accomplished by lateral anastomosis between the extreme upper end of the rectum and the very beginning of the sigmoid. After ligation of the mesentery of the sigmoid the bowel was resected and the ends of the intestine inverted within a purse-string loop of closure. The line of anastomosis was placed below the promontory of the sacrum, the small intestine allowed to fall over the same, and the omentum was drawn down into normal position. The abdomen was closed without drainage.

Post-operative history.—The average, until the twelfth day when there was a sudden rise of temperature of 103° , with frequent respirations, 40. On examination there was found to be distinct circumscribed pleurisy over the lower axillary line; no pulmonary involvement; no effusion; friction continued to grow worse; pain over liver area; tenderness on pressure over gall-bladder area; white blood count rose to 30,000 on December 11th, on which date a muscle-splitting exploration of the tender area was made to the right border of the rectus, three-fourths of an inch above the umbilical line, and small tract of walled-

off pus was found, leading to a pocket beneath the liver. Drainage of same, without opening general cavity, was made, since which time all conditions have improved, temperature being normal and patient is apparently on the road to recovery.

DISCUSSION

DR. A. E. BENJAMIN (Minneapolis, Minn.): I wish to report one case in particular, although I have in mind a number of others of this class that I have seen with symptoms of pronounced constipation. Some of these cases had other conditions than the constipation which demanded operation. I have made it a practice in nearly all laparotomy cases to investigate the condition of the sigmoid. We occasionally find undue angulation of the sigmoid with thickening and some bands. These bands I have separated when abnormal. The previous history usually given has been one of extreme constipation. The one case that is interesting is as follows:

A girl, eighteen years of age, who was attending college, and on whom I operated about six weeks ago, came to me for the sole purpose of being relieved of extreme constipation. Seemingly she had no trouble in any other way. A careful examination revealed slight enlargement of the left ovary. This ovary was also cystic. My experience in other cases had taught me that there was something wrong in this case. I operated and found a very small dermoid cyst of the ovary which could have had very little to do with her condition. I found the sigmoid dilated with extreme angulation, thickened fibrous bands, and some constriction. These bands were separated, and the raw surfaces covered. Since that time her bowels have moved regularly every day without taking a cathartic, but before that she would go a week without a bowel movement.

DR. MCARTHUR (closing the discussion): I would like to ask the members in the future, when making laparotomies, to note whether the mental picture which they now have as to where the sigmoid lies, is confirmed when they first open the abdomen. I confess I have found that it varies, as does the position of the appendages,—sometimes tilting down in the pelvis, sometimes stretching transversely across the abdomen, and sometimes well up on the left side. I would ask them also, if there be disturbance from the normal sigmoid, to note whether there is marked thickening about its

mesosigmoidal attachments. The theory has been advanced that this band of Gersuny contains muscular fibers, and that by contraction it can act as a constrictor and a retainer of the sigmoidal contents until such time as the contents can be readily disposed of; but later observers on making sections have not been able to find the muscular fibers described.

RHINOPLASTY WITH THE AID OF A FINGER AND OF SKIN FROM THE CHEST

HARRY M. SHERMAN, A. M., M. D.

SAN FRANCISCO, CALIFORNIA

In February of 1909 E. F. B., aged 50, a lumberman, was referred to me by Dr. Albert B. McKee, at the University of California Hospital, because of the loss of all that part of his nose beyond the bony portion. This included the alæ, tip, column, and septum; skin, cartilage, and mucosa. The man was healthy; had been a heavy drinker, but had, three years before, stopped entirely the use of alcohol. He had no history nor evidence of venereal infection, but this conclusion was not checked up by a Wassermann or Noguchi. He was a fairly constant smoker of cigarettes.

He said that in 1903 a sore formed on the septum of the nose and perforated it. Then came another on the point of the nose, and increased to a centimeter in diameter, was treated and healed only to break down again and become larger. Slowly by this process the tip of the nose was lost back as far as the bones. He could offer no explanation except that his nose had often been frozen in the woods of Wisconsin where he was employed in lumber-camps. There was left, then, a round hole in the middle of his face bounded by the sharp edge of the nasal and superior maxillary bones, to which the skin and mucosa were closely attached. (Figs. 1 and 2.) The man wished to have a new tip to his nose.

The problem seemed at first to be simplified by the

presence of the nasal bones, but it was soon seen that even the tip of the nose had to have some support, and some framework must, therefore, be supplied. Moreover, it seemed right to give him a lining for the tip, as well as a cutaneous covering, so as to prevent the necessary contraction of a cicatrix-lined organ. Finally there was no tissue on the face which could be used for these purposes. I then turned to the plan of using a finger, worked out the detail about to be described, explained it all to the patient, and warned him especially of the irksomeness and pain of the procedure. He was quite ready to do his part, provided he should always be permitted to smoke, and to this I, with decent consistency, agreed.

The plan arranged for the skin of the finger to be used to act as the mucosa of the alæ, for the bone to act as the mechanical support, and for a flap from the chest to form the cutaneous covering. Therefore, selecting the ring-finger of the left hand, I removed the nail and its matrix, and then made an incision along the mesial line of the dorsum, and dissected the skin outwards from this to the middle of the lateral borders. The joint between the middle and distal phalanges was then erased to secure a synostosis. A pocket was now made under the integument over the right pectoral, and the finger pushed into it. The pocket was wide enough to permit the flaps of skin to be spread out, their deep surface in contact with the deep surface of the skin over the pocket, and in this position they were sutured. (Fig. 2.) The skin forming the pocket had on it a modicum of fat. The arm and hand were dressed in dry gauze, and the whole was bound in place by a plaster-of-Paris bandage. (Figs. 1, 2, 3, and 4.)

Eighteen days later the skin forming the pocket and the finger were cut from the chest, and I found that I had far too much tissue to use and that it was too



Fig. 1. Profile of man before operation.

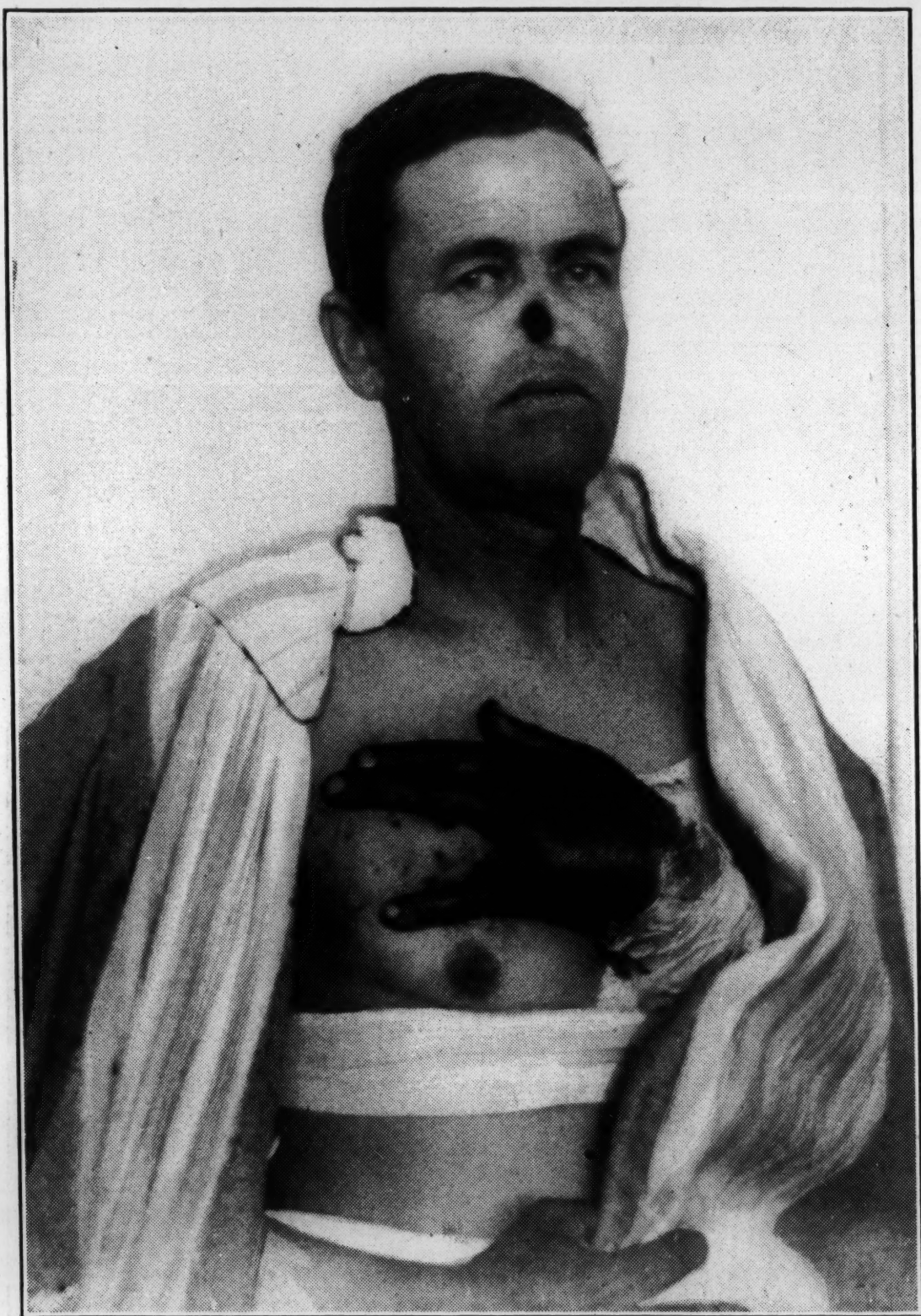


Fig. 2. Full view, showing absence of the nose and the finger under the skin of the chest. The dark coloration on the hand is due to dried blood.

thick and heavy. Therefore I amputated the distal phalanx, split the skin in the palmar surface of the finger, and removed the flexor tendons and resected the base and head of the proximal phalanx, for I had an idea that I should need this bone as an upright to support the others as the ridge pole of the nose. This left only the bone and the skin of the finger. The palmar incision I closed with chromic gut. The flaps on either side of the finger, with now a skin surface on both their front and back, were then trimmed to fit the border of the hole in the face, and the mucosa and skin around this hole were separated and dissected far enough back to make little narrow circumferential flaps. In doing this I exposed especially the nasal bones, then put the cut end of the middle phalanx against them, and next sutured the flaps into place to act as alæ, the digit's skin being sutured to the mucosa, and the chest skin to the face skin. Some redundant chest skin I folded up and stitched so as to save it for some future emergency. The arm, hand, and head were put into a plaster-of-Paris retention. In this position the second and first fingers covered the left eye, and the little finger lay on the right cheek. (Fig. 5.)

The wound in the chest was, of course, taken care of. The chest skin, in its new place, was a little cyanosed at first, but soon became of a good color, and the improvement was from the hand upwards, i. e., the hand was supplying the blood for the flap from the chest. There was, of course, considerable edema in the flap, and the swelling it caused, as well as some restlessness on the part of the patient which morphine and tobacco failed to wholly control, pulled out some of the lower stitches between the new alæ and the cheeks.

Five days after this operation the edema lessened, and fine wrinkles appeared in the skin of the flap showing, I believe, the establishment of the vasomotor con-

trol of the circulation in the flap. Twenty-four days after the operation I shut off the venous circulation in the arm by a rubber bandage, and noted that the flap became cyanosed with the hand and that the hand, after the removal of the bandage, recovered its normal color and circulation much more quickly than did the flap, showing a lack, as yet, of vascular supply to the flap from the face. Twenty-seven days after the operation the same bandage produced cyanosis in the flap more tardily, and when the circulation in the hand was wholly stopped it took from 3.5 to 8.5 seconds for pressure-pallor to disappear in the hand, while in the flap it disappeared as soon as the pressure was released. I took this as showing that vascular connections adequate for the purposes of the life of the flap, were being formed with the tissues of the cheek. Thirty-seven days after the implantation operation, I cut one of the digital arteries going to the finger to graduate the demand finally to be made on the blood supply from the face. Forty-three days after the implantation operation I amputated the finger from the hand, or the hand from the finger, just as you choose to think of it. With no extraordinary precautions the warmth and circulation in the composite graft were maintained, and I very soon saw that I had still too much tissue in the nose, so much that it would be difficult to form nostrils and then keep them patent. Trimming operations were done, and among these I will include the removal of the bony phalanges, leaving their collapsed periosteal sheaths to reproduce a new frame for the nose bridge. Among other details, the pulled-out sutures of an earlier date between the alæ and the cheek were replaced after refreshing the edges of the flap and the nasal opening. These minor events were not so successful as I wished, and it was interesting to note that of the two components the flap was the one that failed. It had enough blood to live

on, but not enough to enable it to make reparative efforts. This relative anemia almost ruined my attempt to make a columna between the nostrils, and it did quite ruin the columna I had planned. I had intended to make the columna by narrow flaps from new nose and from the upper lip,—one cut up from the right and the other from the left, and each swung past the other so that their raw surfaces met. The failure of this scheme forced me to simply stitch the nose flap to the upper lip, the surfaces of contact being made raw, and, curiously enough, this succeeded in producing good union. Finally, to make nostrils I was obliged to put in, at first, rubber-drainage tubes where nostrils should be, and later I replaced these with silver tubes, made to fit the places, with the hope that in time they might be dispensed with, and the nostrils would remain patent without them. Through these tubes the man could breath and blow his nose, and the final result was, as I last saw it, a lump of tissue in the middle of the face which, from some view-points, looked quite like a nose and attracted no attention, while from other view-points, its strangeness and asymmetry were almost as likely to be remarked as was the hole in the face which the man had when he first came to me. (Figs. 3 and 4.)

This paper is not so much to report details as it is to make suggestions. I feel fairly confident that, if I could only do the work all over again, I should succeed in making a very presentable nose. I feel certain that my plan of using digital skin to line the nose, and skin from the chest to cover it, is good, and is founded on a proper concept of the needs; but in this case I cut all patterns, of bone and finger-skin and chest-wall skin, on too wide and too thick a scheme. I really needed only a part of the distal phalanx of the finger, but I took the whole finger and at a later time, to improve the hand, I took out part of the metacarpal bone.

In cases in which the nasal bones were destroyed of course more finger than the distal phalanx would be needed, but in such a case as mine the distal phalanx should suffice. In first cutting up the chest skin to unite to the back of the finger, thrust in beneath it, I kept some fat on the skin flap, and this made my nose too bulky and the alæ too awfully thick. The chest skin used, I should have a minimal amount of fat or no fat. Such a plan would give alæ as finally made of only the thickness of chest skin plus finger skin, and this would be about a normal thickness. Again the phalanges of a man's hand are too bulky to keep whole in his nose, and this is especially true of the bones of a laboring man's hand. In arranging for a nasal bridge of phalanges I would split them and use only half, or less; or I would remove the whole bone, press the periosteal tube flat, and get a new flat little plate of bone to be the ridge-pole or bridge. I would suggest the propriety of cutting the finger on a mesial antero-posterior plane, by knife and fine saw, into two halves and as far down as one needed to use the bone. From the part of the finger that was to be used, I would take the tendons, so as to lessen bulk in the nose and also the demand on the new blood-supply, and I would also take away part, fully half, of the bone. I would do this at the first stage of the intervention and just before the finger was slipped under the chest-wall skin-flaps. I would make it a special point that all the planning and fashioning of the components of the new nose were done in the finger and on the chest, so that, once the implantation operation was done, no tinkering nor remodelling of the finger-chest-skin nose should be necessary. I believe that this is one of the essentials of success,—surely of an approximate artistic success.

Another element of success will be the estimation of shrinkages and the knowledge that as area shrinkage occurs there is increase in thickness, for it is not so

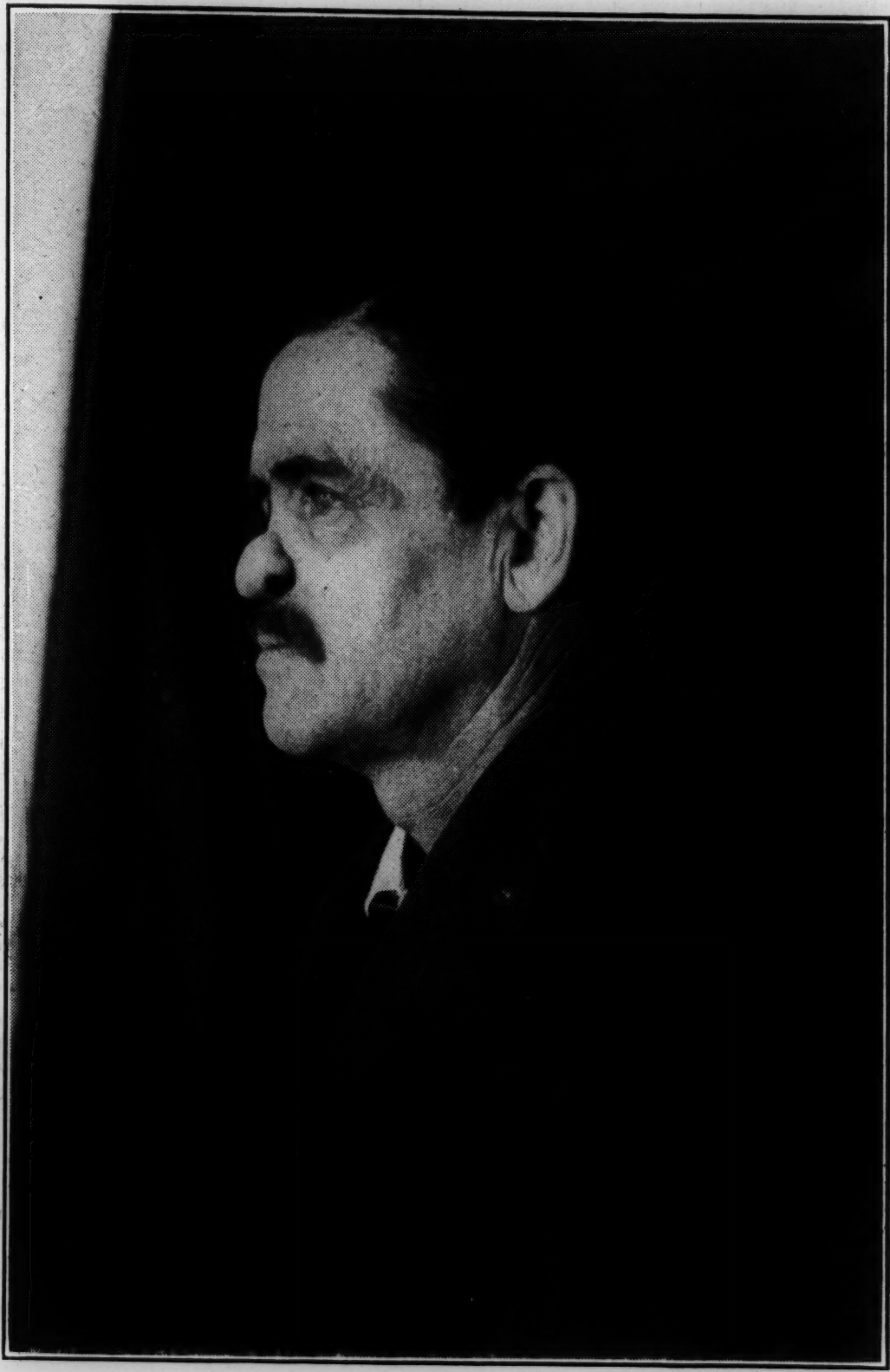


Fig. 3. Profile view after operation.

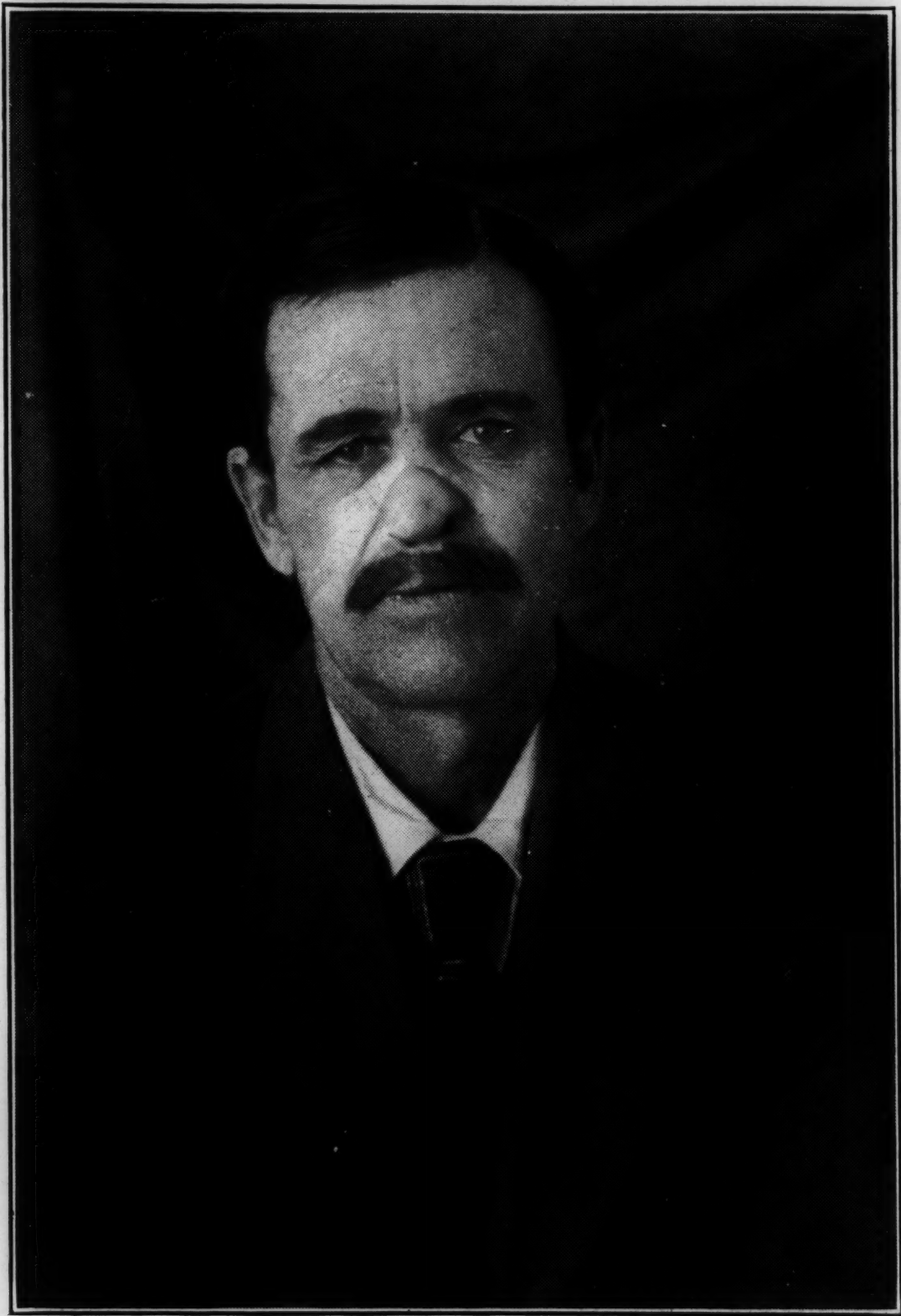


Fig. 4. Full view after operation.

much a disappearance of tissue as it is a rearrangement of tissue elements in the direction of the disposition of elastic fibres, or on planes parallel to surface planes. I believe that in cutting the skin flaps for this procedure a shrinkage of from 20 to 25 per cent should always be allowed for.

In the light of Finney's paper, read at the last meeting of the American Surgical Association, I gave a little too long a time to the union of the chest-wall skin to the finger, for two-thirds of the time I gave might have sufficed; but I had no guide and preferred to err on the safer side.

In separating the hand from the implanted finger-nose, I could, and did, use a most satisfactory guide, that of shutting off the circulation in the hand and noting how the implanted components got on with the blood-supply from this new environment. I was practically certain, when I separated the hand from the finger-nose, that the implanted parts would live.

DISCUSSION

DR. CHARLES H. MAYO (Rochester, Minn.): This is a most interesting paper, and Dr. Sherman has been extremely fair in showing us what he calls his mistakes and in telling us how he could overcome them in a similar operation or if he had this one to do over again. Dr. Finney of Baltimore has reported cases in which he built up nasal bridges in this way. It was a sunken nose, and he utilized the finger to slip in a nose. I remember very well one case he spoke of where he thought he had denuded all the nail from the finger but later found he had not, and a little point of the finger nail was growing out from the skin near the eye, so that the patient had to trim it as he would a finger nail.

The most interesting part of the work, it seems to me, is the transplanting of flaps from one part of the body to another. We have had experience with cases in trying to cover up defects about the nose, eyes, chin, and lower lips of children who have been greatly deformed by burns. Dr. Judd had a case in which he was able to take a skin-flap from the abdomen and fasten it to the hand, the patient not

losing any fingers, laying open a strip along the hand, leaving a flap, and turning it over; and after ten days cutting the flap free from the abdomen, you could bring it in that position for another ten days, simply using the hand as the living member to transplant the flap itself from some other point, and something of that sort undoubtedly can be done here; and in that connection we may say in the building up of eyelids a nice piece of tissue that is capable of living and can be transplanted somewhat in this way among those of the right religion is the prepuce.

DR. JOHN P. LORD (Omaha, Neb.): In all my work in the restoration of noses the chief difficulty has been in getting a shapely nose, and I have tried different methods. I remember in one of the early cases of this kind I took a flap from the arm. After I had by degrees separated the flap and got it grafted, the nose I had on this individual looked like a raw piece of dough. It was so pale that it was very conspicuous. As the man had a florid complexion, with rather hyperemic skin, it gave him a very grotesque appearance. The organ was not shapely either.

At the American Orthopedic Association this summer I saw a framework which was devised for a nose by Dr. Allen of Indianapolis. He makes a shapely framework after accurate measurements. He anchors the nose against the superior maxilla on either side of the nostrils, screws secure it in on either side, the screws anchor the nose thoroughly and in this way he supplies a framework and is able to raise sunken noses and to form a proper nose in rhinoplastic work. He claims excellent results. I have a case in which I expect to use this principle. I have a patient who, in a drunken debauch, attempted suicide by so placing the shotgun and discharging it that it carried away the bulk of the lower jaw, a portion of his upper jaw, and all of his nose. The explosive effect of this charge in very close contact split the face so that the skin of the nose was really not much damaged. The case was referred to me, although I got it a week after the occurrence when everything was septic. The bones were all destroyed, but I am going to have a fair result, I think, so far as the skin of the nose is concerned, but everything is collapsed and sunken. With the arch or framework of Dr. Allen I can raise the thing up, and by a plastic operation restore the mouth. This is not a rhinoplasty exactly, but in all rhinoplasties the chief difficulty is, not so

much in restoring the skin covering over the organ as it is in restoring the shape, which will add to the cosmetics of the case. And one of my difficulties has been to have sufficient substance that would hold up the nose to prevent closure of the nasal apertures and enable the patient to breathe without a sense of suffocation, that the Boston bull-terriers experience in respiration. There is no power to enable them to take in proper air.

Theoretically Dr. Allen has supplied us with a good principle which may serve us a good purpose.

THE PREPARATION OF PATIENTS FOR PROSTATECTOMY

EDWARD S. JUDD, M. D.

ROCHESTER, MINNESOTA

Within the past few years the general tendency regarding the preparation of patients for surgical interference is to reduce the details to a minimum, as it has been demonstrated that patients will do much better if they are permitted to live in their own routine way up to the day before operation. Generally speaking, this rule has been most satisfactory with patients treated in our clinic, although there are some classes of cases that will do better if they are specially prepared.

In reviewing the autopsy findings in cases from our clinic that had terminated fatally following operation for the removal of the prostate, we found that the cause of death in practically every instance was kidney insufficiency, an acute nephritis superimposing upon an old kidney lesion, usually chronic nephritis. It was a little surprising at first to find that the difficulty did not occur in the cases with considerable cystitis where a catheter had been used constantly, but that it occurred in the cases with comparatively clean bladders where a catheter had never been used.

While we must bear in mind that we are dealing with cases which, because of the systemic conditions, i. e., marked arteriosclerosis, etc., are not good subjects for any operation, and that we are also confronted with the fact that frequently the poorest subject, with

the hard pipe-stem arteries, will endure a difficult prostatectomy with considerable loss of blood and be in good condition in a few days. On the other hand, a man in apparently good health will have an easy operation and yet gradually weaken and die in from ten days to two weeks.

With beginning enlargement of the prostate there is not only the difficulty in starting the stream, but the inability to completely empty the bladder. This means that unless a catheter is used there is always some urine in the bladder. As the gland increases in size the amount of residual urine increases until at times the back pressure, coming gradually, becomes a constant factor in the function of the kidney, the urine from the kidney not being allowed to pass freely. Suppose we relieve this pressure suddenly by removing the prostate, at the same time we withdraw all the pressure from the pelvis of the kidneys because the urine is passed unobstructed, which means that the sudden and continued withdrawal of pressure will throw the kidneys into an acute congestion, and if they are already partially disabled the sudden change may prove very serious, resulting in acute nephritis and suppression. This point applies to all cases with a considerable amount of residual urine, but especially to the case where a catheter has not been used. To overcome this difficulty we commence by emptying the bladder with a catheter at stated intervals, two times a day at first, gradually shortening the intervals until the bladder is emptied every hour. In some instances we have left the catheter in the bladder for several days, although this is dangerous at times, and in our experience it has never been satisfactory. We frequently spend from two to three weeks in gradually withdrawing the residual urine.

Occasionally the passing of the catheter is followed by a chill and a general disturbed condition caused by

the irritation to the urethra. This symptom decreases each time and is not a serious complication. Becoming accustomed to this irritation, the reaction following the trauma to the urethra is lessened at the time of operation. It has been our experience that these cases do much better if they have been frequently catheterized for some time previous to the operation.

There is no particular advantage to be derived from special diets. It is important that the digestive tract should be as little disturbed as possible, therefore the regular diet is maintained up to the morning of the operation.

One ounce of castor oil given forty-eight hours before operation is most satisfactory, as the patient will be over the effect of the physic beforehand. Salt solution per rectum soon after operation is helpful in many cases to increase the elimination through the kidneys. Any tendency toward looseness of the bowels is therefore most undesirable.

We frequently find that these cases have been drinking very small quantities of fluids, in order to diminish the amount to be eliminated, as a great deal of suffering is caused when the urine is voided. The arteries of these patients are hard and inelastic, and if we allow this condition to prevail it will be difficult to fill up the circulation, and we therefore encourage the patient to take great quantities of fluids for several days, which fills the circulation and throws the kidneys into marked activity.

Urotropin, given in seven to ten grain doses several times each day for several days previous to operation, will also help the condition and tend to better the quality of the urine.

The local preparation consists in washing the bladder with boric acid solution each time the catheter is used. The urine is all withdrawn shortly before the operation and the bladder left empty.

The skin is scrubbed with soap and water and shaved an hour before the patient is sent to the operating-room. At this time the area is thoroughly cleansed with soap and water again, then sponged off with Harrington's solution for thirty seconds, and this is washed off with eighty-per-cent alcohol.

Several twenty-four hour specimens should be obtained. The amount voided in twenty-four hours and the quality as regards urea, determined by the specific gravity, are the most important factors. Albumin is usually present because of pus from the cystitis. The presence of hyaline or granular casts is not a contraindication to operation, if the specific gravity is high. Blood in greater or less amounts is invariably present, but usually is not of much significance, especially if other conditions are favorable. If the total twenty-four-hour elimination is small, say 400 to 600 cc., the specific gravity under 1010, and hyaline and granular casts are present, we accept considerable risk in operating, but after several days of forcing the amount of fluids and withdrawing all the residual urine from the bladder, we are often able to double or treble the amount eliminated in twenty-four hours, and it will be found that the specific gravity has raised several degrees. The patient will then be in a much better condition for operation.

The cystoscope is very valuable in helping to determine the amount and kind of preparatory treatment these cases should have, and it is also an aid in deciding the type of operation to be performed. Some surgeons do not believe it is wise to cystoscope these cases, fearing to cause complete retention. We have not encountered this complication. While the cystoscope cannot be used satisfactorily in all cases, the information obtained in the majority of instances will be most valuable.

During the past year we have performed 82 prosta-

tectomies, and in 67 of these cases we were able to do a thorough cystoscopic examination. In no instance was the examination especially severe; nor did it cause acute retention. The cystoscope clears up any point that may arise in differential diagnosis, i. e., diverticulitis, neoplasms, stones, etc. At times the ureteral orifices can be seen, and we get an idea of the quality of urine as it comes from the kidney. Cloudy urine shows that pus is coming from one or both kidneys, and not altogether from the bladder. We can also tell the condition of the mucous membrane of the bladder, the number and size of the calculi, if they are present, the size and position of the median lobe, and as to whether it will be easier to remove the prostate through a perineal or suprapubic incision.

An operation should not be attempted during an acute cystitis or epididymitis. Chronic cystitis is almost always present to some degree in all cases. If marked it should be treated for several days by frequent irrigations.

We do not believe it is ever advisable to remove the gland in the stage of acute retention. In 11 of our 82 cases there was acute retention, and we were unable to pass a catheter into the bladder. We cocainized the skin just above the pubic bone over the distended bladder and pushed a large trocar into it; then withdrawing the obturator we passed a retention-catheter through the canula into the bladder. The canula was then removed, and the catheter left as a drain until the patient was in a condition to undergo the operation, which will usually be from two to six weeks.

During the past year 82 prostatectomies have been performed in the clinic at St. Mary's Hospital. The perineal route has been employed by preference, 52 of the 82 cases having been done in that way. Either because of a high-lying gland that we were unable to

reach over by rectal examination, or because of a large stone in the bladder, or a large intravesical median lobe, the suprapubic operation was done in 30 of the cases.

The oldest patient in this series was a man 84 years of age with carcinoma. The youngest was 29 years of age with a tuberculous prostate. Seventeen of the patients were over 70 years. Sixty-six were over 60 years, and five were under 50 years of age. Fifty-five of the 82 patients used a catheter, some of them constantly, others occasionally. In eleven instances suprapubic stab-drain for acute retention was performed preliminary to prostatectomy.

Pathological examination revealed that the enlargement in the gland in 73 of the cases was due to a fibro-adenomatous hypertrophy. There were six cases of carcinoma, one of tuberculosis and two were inflammatory. Stones were present in the bladder in eight of the cases.

Four cases in the series of 82 were fatal.

CASE 1. Patient 54 years old; urine 1001; trace of albumin. Had trouble but few weeks, during which time had lost thirty pounds. Acute retention relieved by catheter. Suprapubic prostatectomy was comparatively easy, and was done in a few minutes,—fibro-adenomatous hypertrophy. The second-day pulse ranged from 100 to 120 and very high tension; voided a few ounces of urine, amount gradually diminished; became drowsy; pulse full; uremic in forty-eight hours; and died on the fifth day.

Autopsy.—Left kidney small, almost no functioning tissue, filled with pus; right kidney large, about one-fifth functioning, and showing acute nephritis, also filled with pus. No other findings at autopsy.

CASE 2. Patient 68 years old; urine 1010; 1625 cc.; hyaline and granular casts; much run down in general way; ten years trouble; never used catheter. Perineal

prostatectomy; large lateral lobes; fibroadenomatous hypertrophy. Patient did well for one week, was up and voiding one-half of urine through urethra. Sudden chill; good quantity of urine, but of low specific gravity and casts; chills became frequent, and the patient died at the end of three weeks.

Autopsy.—Small, hard kidneys filled with small abscesses and acute nephritis; much scar-tissue, and evidence of old abscesses. Post-mortem, otherwise negative.

CASE 3. Patient 61 years old; urine 1003; 1300 cc.; trace of pus. Seven years trouble; had used catheter a few times; suffered intensely from acute cystitis and infection in prostate. Perineal prostatomy and partial prostatectomy done for drainage of infection in gland and bladder. Temperature had been 102° to 103° for several weeks before operation. Infection apparently subsided and temperature was normal for one week, when it became subnormal, and the patient became uremic and died on the fifteenth day.

Autopsy: Very large, foul bladder; marked acute nephritis in both kidneys.

CASE 4. Patient 74 years old; ten years trouble. Acute retention several times; used catheter; perineal prostatectomy; large bilateral enlargement; fibroadenoma. Died on the eighth day of uremia from acute nephritis or chronic.

While it is not reasonable to suppose that we shall ever be able to operate upon these cases without any mortality, at the same time I believe that if we pay more attention to the function of the kidneys before operation, raising this to the highest point possible, we shall reduce the mortality to a very small per cent.

DISCUSSION

DR. JAMES E. MOORE (Minneapolis, Minn.): I am very glad to open the discussion on this paper, because we are all interested in the subject. The suggestion of gradually re-

relieving pressure of the bladder is a most excellent one and one I have been practicing just recently. Just this week, on Thursday, I operated on an old man who was brought in to the University Hospital with complete retention of urine. I first relieved him. I left orders to have him catheterized every twelve hours at first and later every eight hours. He got along rapidly, and then I relieved him by removing his prostate through a suprapubic opening. It is a natural suggestion and it is strange we have not thought of it before, because surgeons have known for a long time that there is considerable danger of suddenly relieving the pressure of the over-distended bladder, and it stands to reason that the over-pressure upon kidneys is a condition much more serious than an over-distended bladder.

I maintain our mortality-rate in prostatic operations is still too high. Nine per cent for the suprapubic and six per cent practically for the perineal operation, are too great; and this paper lays stress upon the point we have all recognized, that the greatest part of our mortality comes from the kidneys, and it behooves us to brace up the kidneys to get them ready for the extra effort, and this suggestion of Dr. Judd is certainly along that line.

ACUTE ANTERIOR POLIOMYELITIS: THE
ETIOLOGY AND BEST TREATMENT
TO PREVENT DEFORMITY

JAMES W. COKENOWER, M. D.

DES MOINES, IOWA

The etiology of acute anterior poliomyelitis has been given much attention recently, and the consensus of opinion confirms the motor-cell lesions of the anterior horns of the spinal cord through the arterial blood supply of the anterior and two posterior spinal arteries.

Bacteriological examinations made by such men as Schultz, Dercum, and many other scientists, confirm the opinion that the disease is epidemic, infectious, contagious, and traumatic; and that toxins in the alimentary canal are one of the most sourceful means of infection, which is proven by the fact that more cases of infantile paralysis occur in the month of September than in any other four months of the year, during the disease or after the child begins to convalesce from an attack of summer complaint.

That the disease is at times epidemic is unquestioned, and is established by ample evidence; and that a common source of infection is the milk supply, is not lacking in evidence and deserves consideration.

The conclusion of Scheele, Holt, and Bartlet was that the disease was contagious, and they reported forty instances where the disease had appeared in from two to seven members of the same family.

Lovet and Lucas report 635 cases of infantile

paralysis in Boston in 1907, and the greater number occurred in the second year of life; and the etiological evidence substantiated the infectious theory, but direct bacteriological proof did not sustain the theory conclusively, yet the character of the onset, the epidemic distribution, the apparent contagiousness, and experimental production of paralysis in animals—all point in this direction.

The fact that the disease selects children during dentition and summer months, and especially August and September, offers evidence of gastro-intestinal disease and suggests a possible source of infection in the intestinal tract from milk bacillus, which liberates toxin, the harmful agent, and then disappears.

The etiological conclusion of literature on the subject does not warrant the statement that any one cause produces the disease, but that there are many, because various degrees and kinds of illness often precede the attack, such as malaise, headache, loss of appetite, varicella, measles, scarlet fever, cholera infantum, otorrhea, and many other diseases incident to child-life.

Hence the disease may be the clinical expression of the reaction of the spinal cord to several causes, of which infection may well be considered one.

At present we must observe, study, and collect material, remembering that we may be dealing (1) with a specific infectious disease, (2) with an infection due to one of several organisms, or (3) with a disease of more than one origin, not always necessarily infectious.

The physician perceives plainly that his patient is suffering from an acute infectious process of some kind, but he is surely to be pardoned if he fails to appreciate its true nature, for until paralysis makes its appearance no pathognomonic symptoms are seen.

I have myself seen a few cases called cerebrospinal

meningitis which proved to be monoplegia or paralysis when the severe symptoms had disappeared. Hence a thorough knowledge of the nervous system is absolutely necessary, otherwise we shall be treating poliomyelitis for scorbutus, torticollis for cervical adenitis, trismus for an inflamed wisdom tooth, and "knee-jerk" for morbus coxarius, all producing deformities from abnormal changes in the nervous system.

The treatment for infantile paralysis has received its share of special attention from the best orthopedic surgeons in this country and Europe, and yet a majority of the cripples seen on our streets are caused by anterior poliomyelitis; hence the truthful saying that "nothing is more misleading than facts, unless it be figures," is not ill-timed when we consider the inefficiency of our former treatment and the number of cripples seen daily.

The plan of treatment I have recently used in acute infantile paralysis cases has been in accord with the influence of environment and lapse of time.

As soon as the disease is recognized I would put the patient in a recumbent position until spontaneous recession takes place, which will often take several months and sometimes more than a year; and here is where the difficulty arises in keeping a child well and quiet, yet it can be done, to a certain extent, and we have the consolation of knowing that we have selected the lesser of the two problems under consideration.

The deformities seen are more frequent in the lower extremities than in the upper, which is not strange when we pause to think that the arms are free, while the legs bear the weight of the body, so when the joints of the lower extremities are affected, or even suspected, they should be protected by recumbency or proper mechanical appliances or braces, hence the rational conclusion is physical simplicity in cause and effect.

Disability from this disease is seen almost ten times as often in the lower as in the upper extremities, and yet in the early stage the paralysis is found in all parts of the motor system, and we find the recumbent position absolutely favorable to spontaneous recession of the paralysis.

The arms and hands retain this advantage when the patient is erect, but the impaired muscles of the legs and feet give way at once when they meet the weight of the body, and they become attenuated and elongated, and could not be put in a position more damaging to them. The result is plainly seen in all kinds of club-foot, short tendo-achilles, anterior muscles of the thigh, and flail-joints.

Therefore, if in acute anterior poliomyelitis we can, by means of a recumbent position, give to all the muscles alike the same opportunity for spontaneous recession of the disease in them, we shall not see ten times as many deformities in the lower extremities as we do in the upper, and the number of deformities from this disease will be materially reduced.

Another treatment in this disease, when it has taken on the chronic form and the deformity is well marked, which has proven very satisfactory in my practice, is repeated plaster casts at short intervals; while the patient is under an anesthetic and the muscles and tendons are easily stretched, the deformity can, with this treatment, be gradually overcome, and the limbs become stronger and more useful than they would be in overcoming the deformity by myotomy or tenotomy, although there are some cases that require both methods.

However, these methods should not supplant their valuable adjuncts of passive motion, exercise, electricity, massage, local applications, and judicious medication, all of which will make it easier to carry out the recumbent position with ultimate better results.

LYMPHANGIOMA, WITH REPORT OF A
CASE OF MACROGLOSSIA AND ONE
OF MACROCHEILIA

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"A lymphangioma is characterized by the formation of new lymphatic structures, the process extending to places in which normally no lymphatics are found." (Senn.)

"Hyperplasia of the connective tissue often accompanies ectasia of the lymph-vessels." (Ziegler.)

A lymphangiomatosis of the tongue is known as macroglossia, of the lip as macrocheilia.

Hektoen classifies lymphangiomas as being of two kinds, viz., true tumors in which new growth of lymph-vessels takes place and tumors arising from dilatation of preëxisting lymph-channels or from their hypertrophy. Subvarieties are found depending on morphologic peculiarities, viz.: capillary, cavernous, and cystic.

Capillary lymphangioma is composed of lymph-spaces and hypertrophied lymphatic vessels, which constitute an anastomosing network. The cavernous variety is composed of a framework of connective tissue with communicating spaces, which contain lymph.

The cystic form presents macroscopically an appearance of convolutions of large and small vessels with translucent walls containing lymph. These vessels are dilated new lymphatic vessels, which have partially or

wholly lost their connections with the lymphatic system. Sometimes these cysts contain chyle—chylangioma.

When found beneath the skin of the neck a lymphangiomatosis has been described as a hygroma. Senn says the tumor may extend in an upward direction as far as the neck and downward as far as the mediastinum. In the neck the tumor follows the direction of the lymphatics, along the large blood-vessels and the inter-muscular septa. Some of these tumors are transformed into hemolymphangiomata.

Multilocular lymphangioma has been found in the mesentery, in the lungs, and in the kidney.

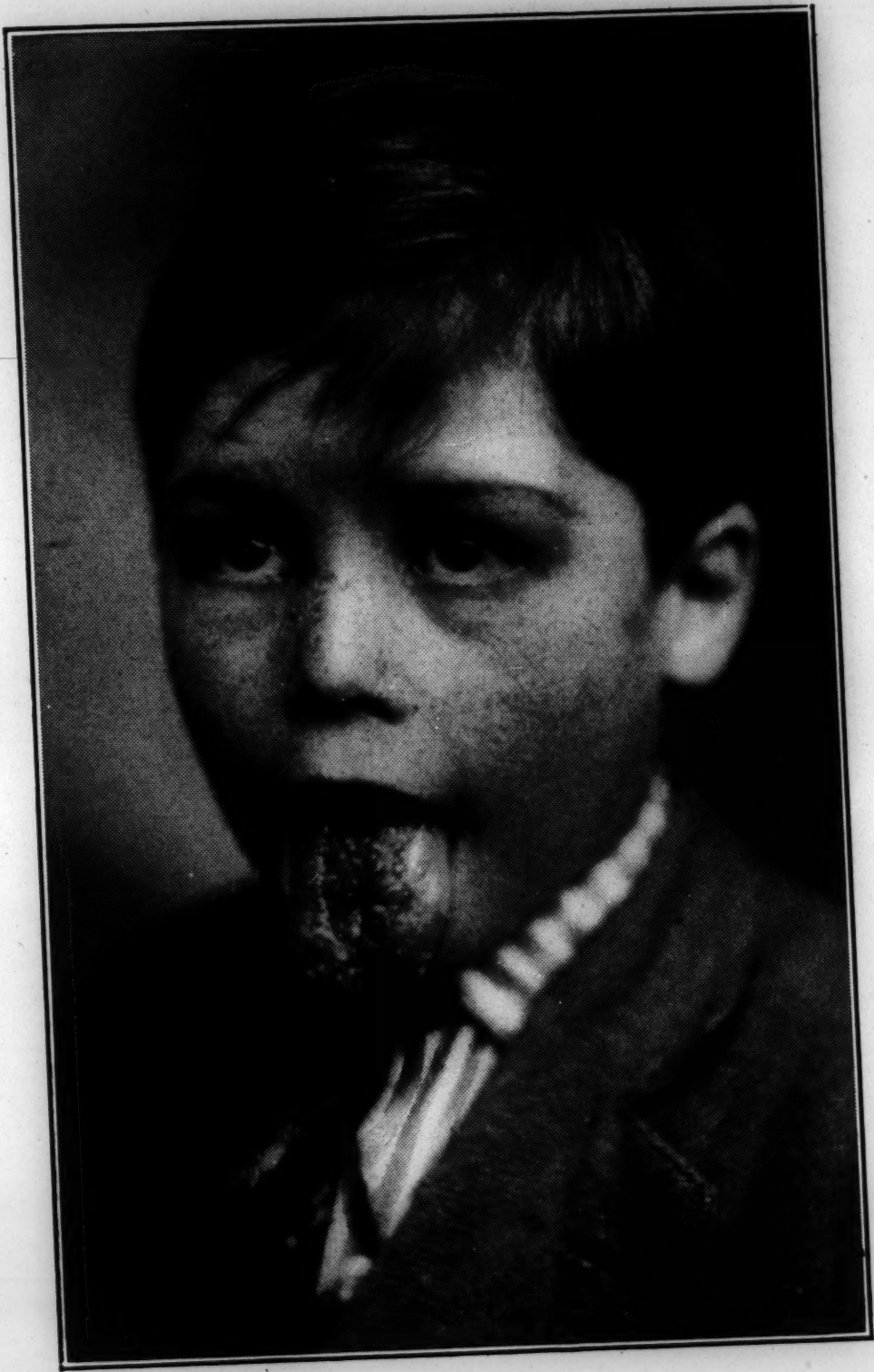
The essential pathological condition in certain pigmented birth-marks, freckles, and cutaneous warts, is a local dilatation, or hyperplasia of lymph-vessels, more or less diffuse.

Histologically, lymphangiomata are characterized by their resemblance to lymph-vessels, or lymph-spaces, found in healthy tissue. Scattered through the connective tissue, islands of small round cells (lymphocytes) often abound.

Many of the lymphangiomas are congenital in origin, as seen in macroglossia and macrocheilia. Others are of post-natal origin. Some instances of their development in old age have been seen. Both the congenital and acquired forms may show not only a dilatation and hypertrophy of the normal lymphatic channels, but a new formation of lymph channels.

Lymphangiomas are benign, but as they are composed largely of endothelial elements, they may be transformed from a lymph-vascular neoplasm to one or other of the varieties of endotheliomas. (Hektoen.)

Microscopically, macroglossia often presents more the appearance of hyperplasia of the tongue than that of dilated lymph-channels. (Senn.) Young muscle-fibres are met with, which proves that the muscular



Boy, aged 7. Macroglossia.

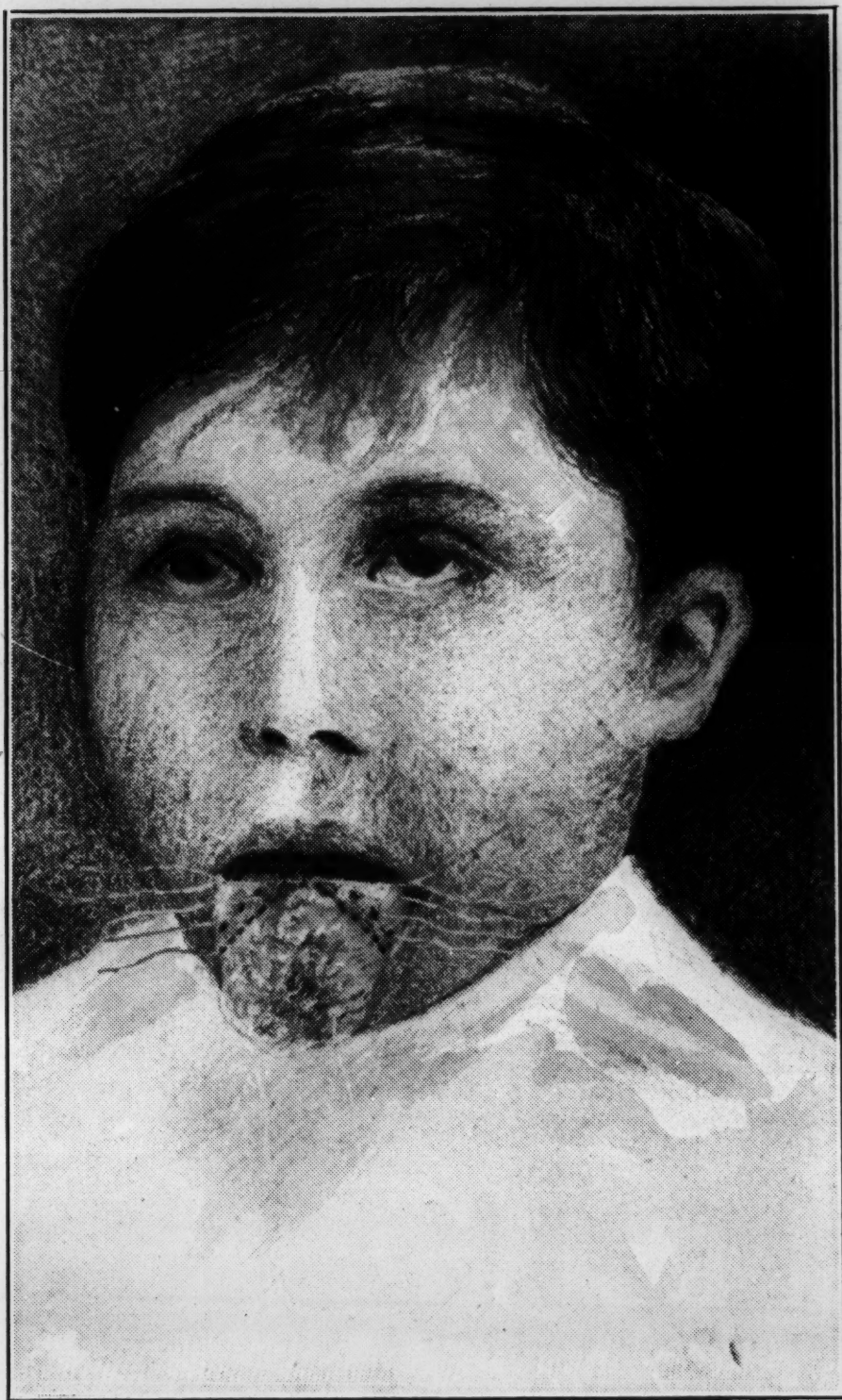


Fig. 1. Showing the method of inserting the traction, the transfixation, and the approximating sutures in the tongue.

The portion of the tongue distal to the dotted lines represents the part of the organ removed.

tissue is also increased in quantity. Macroglossia in the later stages may show angiomata as well as multilocular lymph-cysts.

Ulceration may be produced, the result of pressure from hyperplasia beneath or irritation of the surface.

Fatty degeneration and calcification are the most frequent form of retrograde tissue-metamorphosis of the connective-tissue stroma of lymphangioma. Cystic degeneration also occurs. Aseptic thrombi occur in this condition. Septic thrombosis gives rise to inflammation of the neoplasm. Macroglossia and macrocheilia can usually be recognized without much difficulty. All the involved tissues are hypertrophied.

Prognosis.—Great enlargement of the tongue may, as in the case reported, interfere with speech, mastication, and deglutition. There is liability to infection, and more rarely to transformation into sarcoma. The condition sometimes recurs, as in a case operated at St. Mark's Hospital by Dr. U. Worthington, which had previously been operated upon by another surgeon.

Treatment.—Where practical the proper treatment of lymphangioma is excision. In macroglossia, if the swelling interferes with mastication, speech, or deglutition, the proper treatment is partial excision.

In macrocheilia partial or complete extirpation is indicated for cosmetic purposes, as well as being a prophylactic measure against infection or malignant degeneration. In the case reported, by means of a wedge-shaped excision parallel with the long axis of the lip, the latter was reduced to normal size.

MACROCHEILIA REPORT OF CASES

April 6, 1909. Man, aged 23; American; seen in consultation with Dr. A. N. Minear.

Family history: Negative.

Personal history: Patient states that his upper lip

has been abnormally large since birth. During the last three years the condition has been much more troublesome. Examination showed a diffuse symmetrical swelling of the upper lip, which was enlarged to about three times its normal size and presented an eversion of the mucous surface with a fissure centrally located.

Operation.—A wedge-shaped excision, parallel with the long axis of the upper lip, was made. The result cosmetically and functionally was satisfactory.

The diagnosis in the case was made on the clinical history and macroscopical appearance.

1. Macroglossia.—On October 11, 1909, the patient, a boy, aged 7 years, came to my office; nativity, American.

Family history: Father living, in good health, aged 37; mother also in good health, aged 36; four sisters and one brother, all well.

Personal history: With the exception of the condition of his tongue he has always been healthy. His parents stated that his tongue had always been larger than normal since birth. About five years ago his parents noticed an increase in the swelling of his tongue, accompanied by white patches on the lingual surface. The tongue has gradually but slowly increased in size until at present it presents a thickening, involving the anterior two-thirds of the organ, which has increased to twice its normal diameter. The surface of the tongue is furrowed with three distinct fissures. The papillæ are red, roughened, and enlarged. On palpation it feels slightly harder than normal. (See picture.)

The area of the tongue showing distinct involvement measures two and one-half inches anteroposteriorly, and two inches laterally. The lateral sides of the tongue are smooth; the upper and lower surfaces show distinct irregularities. Various small areas of

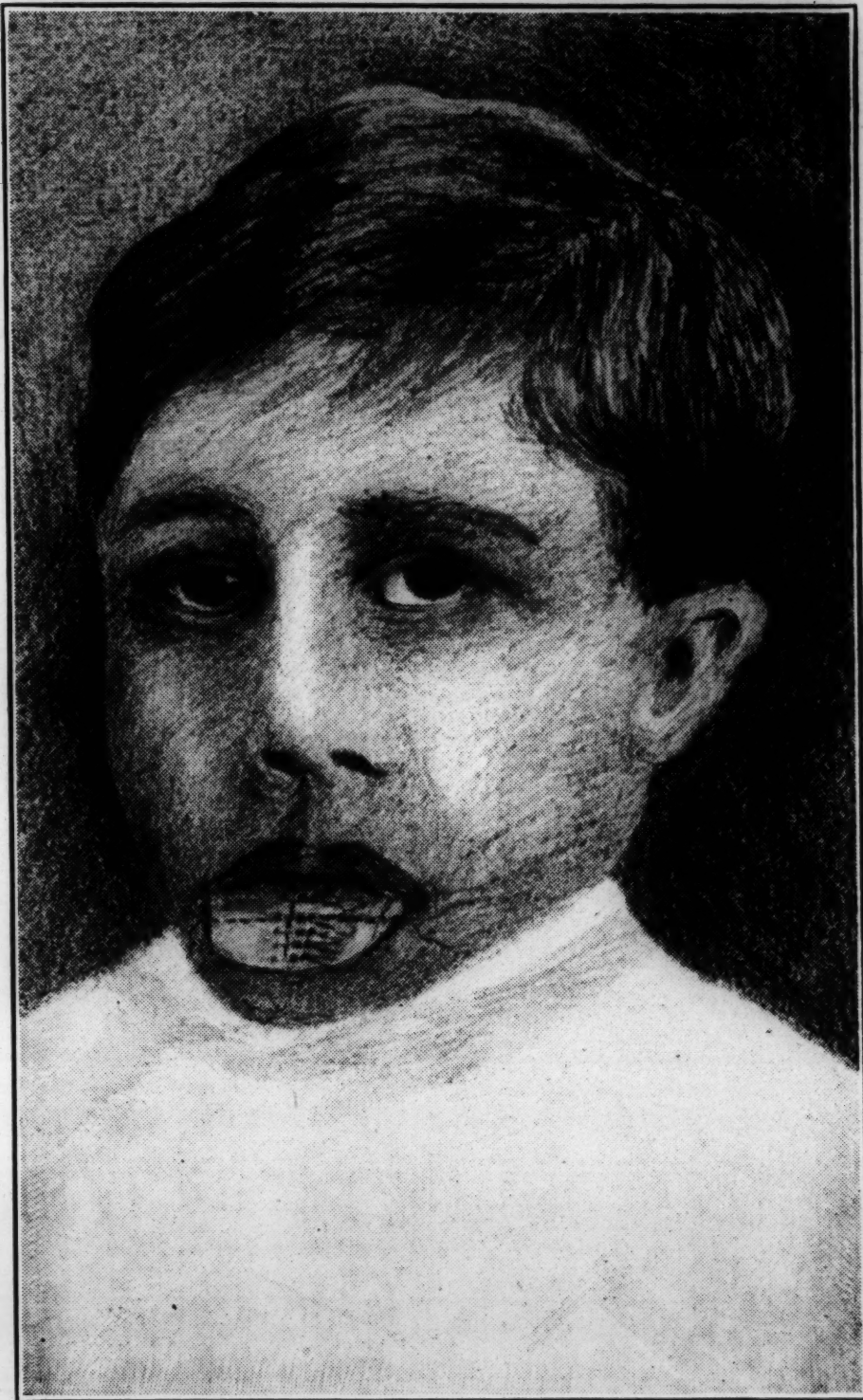


Fig. 2. Showing the method of approximating the stump of the tongue. The transverse dotted line represents, diagrammatically, the tongue suture through the tongue held in position by a perforated silver plate on each side of the organ. The ligature passes through the center of the silver plates and is held by two compressed shot on each end.

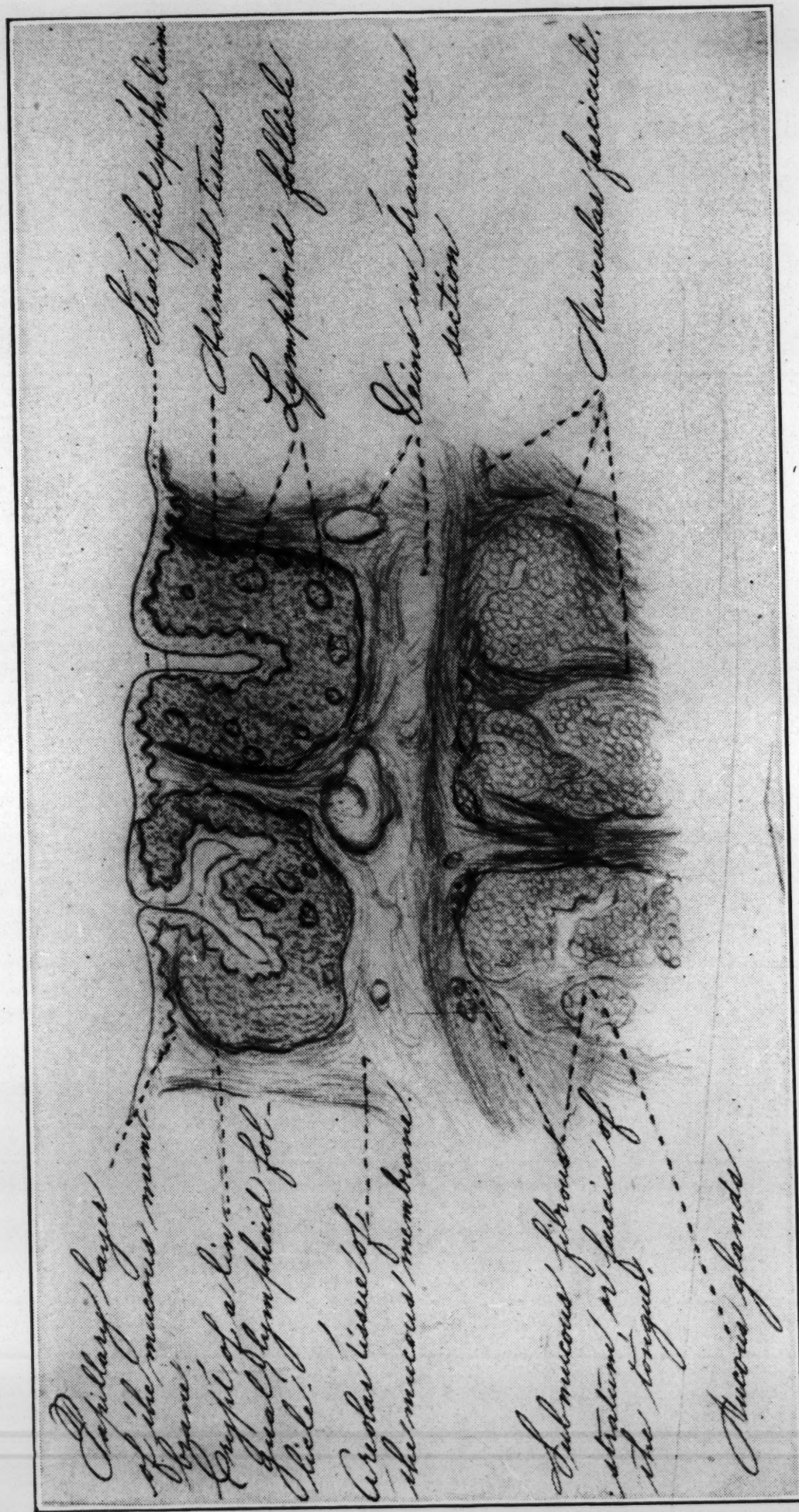


Fig. 3. Two lingual lymphoid follicles, or follicular glands of the tongue, in longitudinal sections. (From Fold's Anatomy.)

whitish exudate cover the upper and lower surface of the organ. There is impairment of speech, and some difficulty in mastication and deglutition. Adenoids are present in the throat.

October 13, 1909. Removed the adenoids. This was followed by treatment of his mouth and throat by mild alkaline antiseptic sprays, etc.

October 30, 1909. Removed the anterior portion of the tongue (about two inches) by wedge-shaped incisions.

TECHNIC.—*Anesthetic.* I began with chloroform which the patient took badly, and changed to ether. Junker's apparatus was used after getting the patient anesthetized by the drop-method. The tongue was held by two heavy silk traction ligatures, inserted about one-half inch from the tip, a blunt pointed, curved needle (Cullens liver-needle) being used. Two transfixation control-sutures on either side of the tongue posterior to the area to be removed, were inserted in the median line of the tongue and tied on each side, thus transfixing the tongue and by traction minimizing the bleeding. (See Fig.)

The anterior portion of the tongue was removed, wedge-shaped. The lingual arteries were grasped with forceps and tied with catgut ligatures. Some oozing persisted from the cut surface of the tongue, which was controlled by tying with catgut sutures. The upper and lower cut surfaces were then sutured with silk, each ligature being fastened with two perforated compressed shot. The ligatures were left long to facilitate removal. The posterior transfixation sutures were allowed to remain on the tongue temporarily. With the exception of about one-half an inch at the tip of the tongue where the stitches tore through, the wound healed by primary union. A few days later, in order to get a perfect union, I resorted to a new method:

The anesthetic used was ether. The head was turned to one side and a long large wick of gauze inserted in the angle of the mouth to drain the saliva, blood, and mucus out of the oral cavity.

The tongue was held by the traction and transfixation sutures as before, four being used. The edges were freshened by incisions and sutured as before, with the exception that the ligatures were cut short. A tension-suture of heavy silk was placed transversely through the tongue, about one-half inch posteriorly to the tip, and held in position by two perforated silver plates, each about one-half inch in diameter, with two perforated, compressed shot fastened external to the plates. The sutures were removed on the third and fourth day. Accurate primary union was secured. The pain during mastication and deglutition is entirely relieved. The power of speech is practically normal.

The accompanying original photograph and drawing illustrate the clinical appearance, the microscopical findings, and the technic of operating in the case of macroglossia.

The drawings from Toldt's Anatomy illustrate the normal lymphoid follicles, or glands of the tongue.

REFERENCES

- Hektoen-Riesman: Pathology.
Senn, N.: Pathology and Surgery, Treatment of Tumors.
Reference Handbook of the Medical Sciences.
Ziegler: Pathology.
Toldt: Anatomy.
Johnson: Surgical Diagnosis.

DISCUSSION

DR. CLIFFORD U. COLLINS (Peoria, Ill.): I am interested in this case because it brings to my mind a case of macrocheilia I had three years ago in which the result was not such as I wished to get. The patient, a little girl, twelve years of age, was born with a congenital enlargement of the upper lip, which gradually increased in size until it was almost like a proboscis. I made an attempt to lift up the skin and mucous membrane, taking out a wedge-shape piece and

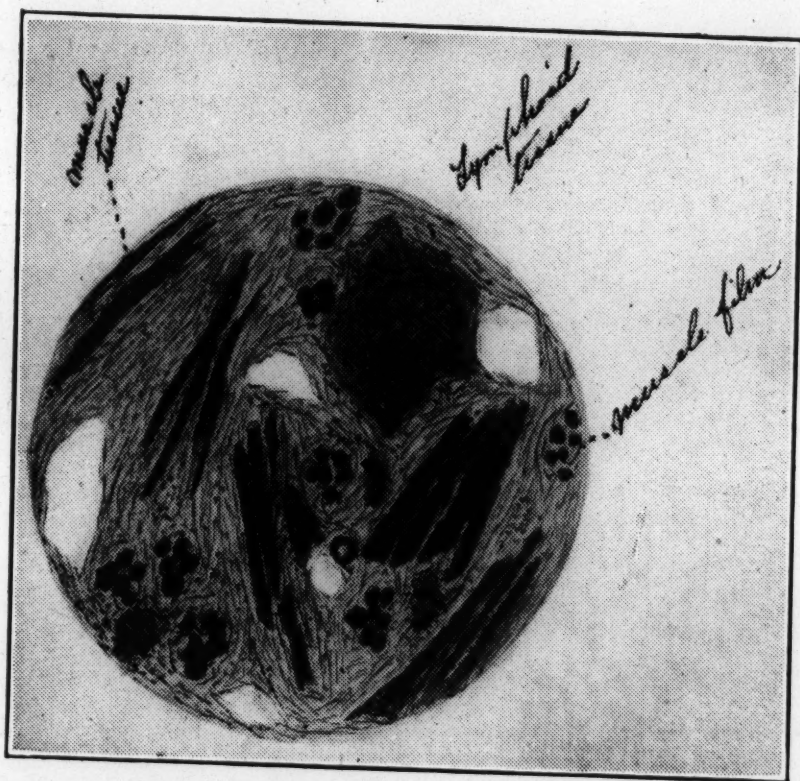


Fig. N. Lymphangioma-Macroglossia.



Fig. 1. Cystic lymphangioma. (Front view.)

Figs. 1 and 2 are reproductions of photographs exhibited by Dr. Mann in his discussion on Dr. Kerr's paper.

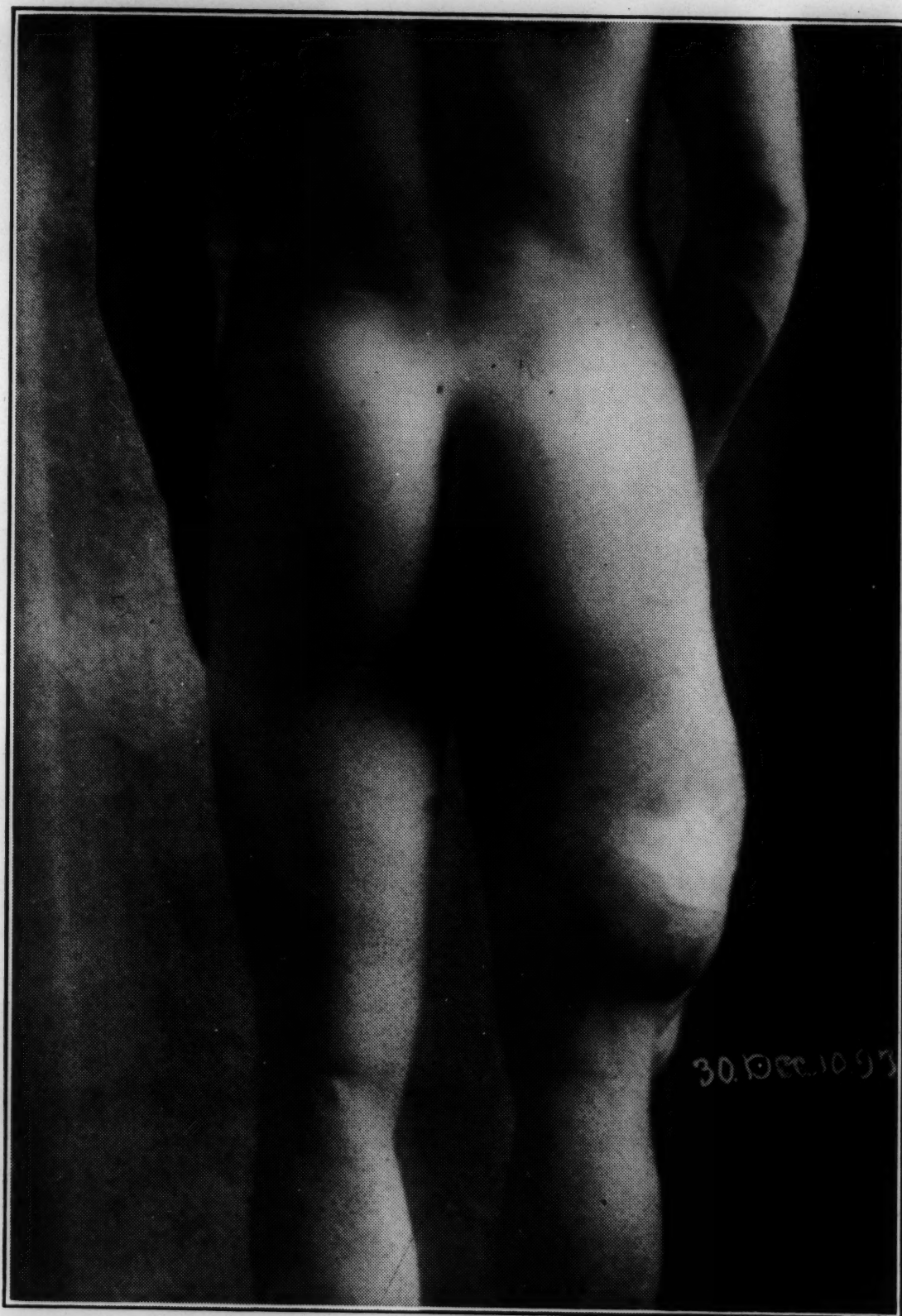


Fig. 2. Cystic lymphangioma. (Back view.)

closing it, but the condition recurred. The lip was larger than it should have been. The picture was very much the same as the result Dr. Kerr says he obtained the second time. I lifted up the skin and mucous membrane and removed all abnormal tissue, but in a few weeks recurrence took place. We made a section of the mass removed, and that presented the same kind of tissue. It was not malignant. The parents were not pleased with the result, neither was I. It improved the cosmetic appearance of the child a little. Fortunately, several photographs were taken before anything was done, and some improvement was noticeable, but not as much as I desired or the parents desired; and if any of the members of this Association have a way of operating on these cases of lymphangioma of the upper lip so as to get good cosmetic results I wish they would tell me about it.

DR. JOHN P. LORD (Omaha, Neb.): Some years ago I had considerable experience in this particular pathological condition, but in recent years I have not been doing so much. But I have some convictions on the subject. I believe we can very much limit the necessity for operative intervention in these cases if we will use electrolysis and condense the connective tissues to a large extent. I believe in temporizing in these cases where it is possible to do so, because there seems to be no limit to the necessity for operative intervention unless we are able to go beyond the disease. Having seen the benefit of injections of hot water in angiomata, it is my determination to use that method in the treatment of this condition when the opportunity presents itself.

DR. ARTHUR T. MANN (Minneapolis, Minn.): The subject of lymphatic tumors is very interesting because these growths are rare. Whether it is a nevolymphangioma, such as occurs in the tongue and lip where the growth is practically all an involvement of the lymphatics in connection with the mucous membrane and does not involve the muscular structures of the tongue, as a rule, or whether they are cavernous lymphangiomata or lymphatic cysts, the best samples of which we have in cysts of the neck, they must be dealt with surgically.

I have pictures here of a very unusual lymphatic cystic growth in the thigh. I will pass around these pictures.

The patient was an Italian, twenty-nine years of age, who had this mass in the thigh for two years, and so far as I could find out the only thing in regard to the previous history was

an injury which was rather indefinite. The tumor first appeared near the anterior-superior spine and remained there for about six months and then began to travel down. It is irregular in shape. It fluctuates. It is about the size of a human head, flattened out on the outer aspect of the thigh largely. There are hard masses of small size to be felt in places as though they were connective-tissue points, with round septa and pillars, some of which have given way and some of which are still there. This case did not come to operation, I am sorry to say.

About three months ago almost an identical case came into the office, and I had no plate in my camera. I told the man to come back later for operation, but he did not return, and so I cannot report that case with pictures. The tumor was in the thigh. It was similar in every way to the case just given, though slightly smaller, and it had existed for about one year and a half.

These are exceedingly rare tumors in the thigh. Nordman reported one case and looked up the literature carefully up to 1901 and could not find a single case in which the cystic growth appeared in this, the outer, aspect of the thigh. He found some on the interior aspect of the thigh. His own case was apparently the result of a fall. A fleshy woman fell on her buttocks seven years before he saw the case. The only result was pain, and the only thing she noticed was a soreness in the region of the first bruise. At the end of a year she noticed a swelling just beginning, and during the next six years it gradually extended down to the knee and the popliteal space. The skin, as in this case, was normal except it showed some dilated veins and it was movable on the tumor. The tumor appeared to be movable on the part below. The mass appeared to be fastened to the fascia lata. On dissection, he remarked, it was very easy to enucleate the mass. When the mass was taken out the muscles were bare, that is, the fascia lata was in the wall of the cyst. It was a single cyst with a few remnants of septa and fibrous bands. A microscopical examination was made. The cystic wall was found to consist largely of connective tissue lined with one or more layers of endothelial cells. It contained a lemon-colored fluid, alkaline in reaction, that coagulated on boiling, evidently albumin-containing serum. The case did not heal. She discharged a large amount of serum. His explanation of the case was the same as mine, that there was an injury to the lymphatic vessels, an extravasation of lymph, and more lymph

accumulated than was absorbed. It gradually became surrounded by a scar of connective tissue and lined by the endothelium from the lymph spaces. He remarked that if he had ligated the pedicle of the fascia he might have closed the vessels and not have had trouble. The woman refused a second operation to cure her. He injected iodine and, later, silver nitrate without result. Then a ten-per-cent solution of zinc chloride was used and caused sloughing. The wound became infected, was opened, and then healed by granulation, and the granulation-tissue closed the lymphatics, which had been causing the trouble.

One other case on the internal aspect of the thigh in which the tumor presented in and below Scarpa's triangle, was apparently fluctuant, and because these tumors are so exceedingly rare he made a probable diagnosis of hernia in his case. There was a little cord felt running up from it under Poupart's ligament, the size of two fingers and the tumor could be partially emptied by pressure. His dissection was exceedingly difficult. The tumor ran under Poupart's ligament and an inner sac communicating with the one in the thigh lay external to the artery under the pelvic peritoneum, but over the pelvic fascia and up to the transverse processes of the lumbar vertebræ, making necessary three incisions, one in the groin, one in the iliac region, and one in the lumbar region, before he felt he had got all of the cystic tumor out. The patient was discharged five weeks later with two sinuses still open.

DR. JAMES F. PERCY (Galesburg, Ill.): I had an experience with one of these cases a year ago, and the case is still under observation and treatment. The patient is a man, sixty-four years of age, with a gradually increasing tumor in the right groin. He gave a history extending over some seven years, during which he attempted to have no treatment. At least, no treatment was attempted until pain began to be a pronounced symptom in the case. I operated and got into the same kind of trouble that has been mentioned by Dr. Mann in his last case. The tumor in my case surrounded the iliac vessels, and the last part of the operation consisted in shaving the tumor off of the vessels and in keeping tab on my nearness to the vessels by touch. The man did well after the operation. He got primary union and had no pain for some time.

I had sections made of the tumor and worked it up, and they were examined by three different pathologists, all of

them pronouncing it lymphangioma. The subsequent history of the case is interesting because of the gradual return of the condition, and then I suspected that the pathologists had made some mistake and that it was a malignant growth we were dealing with. I saw the patient three or four months after the operation, and the operative area had been converted into an enormous keloid. The tissues were very hard, red, and angry-looking, and the pains had returned; and then I did, what so many of us do as a last resort, I used the x -ray, and he has been under the x -ray for nearly a year and seems to be getting good results. The mass inside the ilium is not larger than a hen's egg, and the keloid has practically disappeared on the surface, and the man is comfortable and feels as if he were going to get well. Just what part finally in the history of this case the x -ray will play I do not know.

DR. KERR (closing the discussion): I have not anything special to say, except to thank those who have participated in the discussion of my paper. I was especially impressed with the fact that recurrence takes place in these cases, and I shall not be disappointed if the condition recurs in this case.

The suggestion made by Dr. Lord is a good one, and it may help us out in the prevention of recurrence.

NOMA, WITH THE REPORT OF A CASE
THAT RECOVERED WITHOUT
PERFORATION

MILES F. PORTER, A. M., M. D.

FORT WAYNE, INDIANA

Noma is a rare disease. Out of 13,000 cases admitted to the London Hospital for Sick Children there were only six cases of noma.

It is essentially a disease of young childhood, but has been observed in persons of all ages up to 70. It is more often seen in adults in India than in any other country. Nursing babies seem to be in great degree immune. Noma does not confine its ravages to the human race, but attacks the lower animals also.¹ Noma usually occurs in the mouth, but not infrequently attacks other parts, especially the vulva, the rectum, and the external auditory canal. Holt² saw five cases beginning in the auditory canal, apparently due to the use of the same syringe to clean the ears without disinfection. It is more frequent in girls than boys. Noma is especially apt to attack persons debilitated by previous or existing disease. Of the predisposing diseases, measles is by far the most important. Osler says that half the cases occur during the convalescence from measles. Noma has been known to occur, however, in strong children and in healthy adults. While

¹White and Blackwood: University of Pennsylvania Medical Bulletin, December, 1908.

²Crandon, Place, and Brown: Boston Medical and Surgical Journal, April 16, 1909.

bad hygienic conditions seem to predispose to noma yet it has been known to occur in patients with the best hygienic surroundings. This is true of the case reported in this article.

That trying climates predispose to this disease seems proven, especially cold, damp climates.

There is good reason for believing that the indiscreet use of mercury predisposes to the development of noma. It is quite certain that diseased teeth, and especially gingivitis, are important etiologic factors.

My patient had a severe pyorrhea when she came to me and had had it some time before the development of the noma. The experience of Holt, above mentioned, of Lund, of Siebert, and especially that of Blumer and MacFarland in the Albany Orphan Asylum leave no doubt in my mind of the contagiousness of noma. It is equally certain, on the other hand, that it is only slightly contagious.

While we are not in a position to say just what germ or germs produce noma, I think we are warranted in saying that it is a germ disease, but that the germ or germs producing it require a peculiarly prepared soil, hence the conclusion that it is contagious, but only slightly so.

As above stated, the bacteriology of noma is as yet not fully understood. The weight of evidence seems to be in favor of the theory that noma is "due to the combined action of bacteria from the mouth acting upon specially vulnerable tissues."³ Buday regards the symbiosis of a spirillum and fusiform bacillus of especial etiologic importance. The investigations of Perthes make it highly probable that the essential etiologic factor is an anaërobic organism. The majority of investigators regard noma, ulcerative and gangrenous stomatitis, gingivitis, and Vincent's angina as iden-

³Weaver and Tunnicliff, *Journal of Infectious Diseases*, January 1, 1907.

tical processes differing only in degree. Some there are, however, notably Kissel,⁴ who dissent from this view.

The investigations and experiments of Petruschky and Freymuth, and Passini and Leiner seem to prove that in some cases of noma diphtheria bacilli play an important etiologic rôle.

In the case herein reported the patient suffered from diphtheria two years before the attack of noma, and at that time had a gangrenous ulcer of the tongue, the resulting scar from which was plainly visible when the patient was brought to me.

The pathologic and microscopic anatomy of noma have been well worked out, the symptomatology thoroughly studied, and the physical signs carefully observed and noted, hence the diagnosis is easy.

Pneumonia is by far the most common complication, occurring in 58 out of 63 cases collected by Tourdes, and in 19 out of 21 cases examined by Barthez and Rilliet, and is the immediate cause of death in practically all fatal cases. Coincident gangrene in other parts of the body is not infrequent. Severe and even fatal hemorrhage has been observed, but this is a rare complication. All observers agree that noma is usually fatal and that in the majority of cases which recover the deformity is frightful. Recovery is slow when it does occur. Toothlessness and defective speech are common results in cases that recover. Relapses sometimes occur after convalescence seems well established. Extreme youth, old age, bad hygienic surroundings, extensive involvement of the tissues, and bad general health influence the prognosis unfavorably. This is true of complications also, especially pneumonia. Other things being equal, the longer the patient survives the more likelihood of ultimate recovery. Noma of the auditory

⁴Journal A. M. A. (ab.) vol. xlv., p. 1994.

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canal and genitalia seems to be especially fatal. Whether we agree with Crandon, Place, and Brown, in their opinion that noma is not contagious, or with Weaver and Tunnicliff, who hold the contrary view, it is certainly wise to isolate all cases. In view of the frightful mortality every precaution should be taken to prevent the occurrence of the disease.

The mouths of delicate children should be carefully looked after and kept clean. Especial attention should be given to the mouths, ears, and genitalia of sick children, especially those suffering from measles, diphtheria, typhoid fever, or any form of stomatitis, or gingivitis. Of scarcely less importance than the local measures in preventing the disease are those looking toward the general condition of the child, such as good food, proper clothing, and pure air—in a word, good hygienic conditions. My own experience in the treatment of noma is limited to two cases, the one herewith reported and one other seen with the late Dr. A. E. Vanbuskirk. In both recovery ensued, and in neither was either the knife or cautery used. This experience is, of course, entirely too small to base conclusions upon, but this experience together with a careful study of the literature of the subject compels me to dissent from the view so generally expressed that excision or the use of the cautery or both is the best means of arresting the disease. The general condition of the patient seems to play almost, if not quite, as important an etiologic rôle as do microorganisms. This opinion is given additional support by the fact that relapses not infrequently occur and that plastic operations for the relief of deformity due to noma are apt to lead to extensive sloughing if undertaken too early. It would seem, therefore, that the knife and cautery should be used only in the cases seen early, before much destruction of tissues has occurred and in those cases in which the general condition of the

patient is fairly good. In the case herein reported anything like what is generally described as an adequate use of the knife and cautery would have resulted in the loss of a large part of the cheek, whereas under the treatment used no perforation occurred and hence there is no deformity. In the other case seen by me there was a moderate destruction of the lower lip, which could easily have been restored. The seeming importance of the bacillus fusiformis in the production of noma and the fact that this bacillus is anaërobic, would suggest the use of peroxide of hydrogen in the prophylactic as well as the curative treatment of the disease. This was borne out in the experience of Crandon, Place, and Brown, and in my own. Permit me to recall here the fact that most of these patients die from pneumonia.

The writer would therefore urge the employment of the open-air treatment, together with forced feeding and the frequent local use of peroxide of hydrogen, reserving the use of the knife and cautery for the cases wherein the disease may be eradicated without too great a sacrifice of tissue and wherein the clinical features seem to point to the microörganisms as the chief etiologic factors rather than the generally impoverished condition of the patient.

When the bacteriology of the disease is known we may expect good effects from the vaccine treatment. In my own case this was employed, but without striking results, and inasmuch as there was a slight relapse, after the patient went to her home, from which she recovered without the vaccines, I do not feel warranted in giving them much credit for the result in this case.

In conclusion, I would especially refer those interested in this subject to the excellent papers of Weaver and Tunnicliff, and Crandon, Place, and Brown, both of which have been already referred to in this paper.

AUTHOR'S CASE

The following case was referred to me by Dr. Reid of Van Wert, Ohio, and was seen by me first on May 30, 1909, at the Hope Hospital:

H. E., female, aged 15, school-girl. Family history, negative. She has had all children's diseases, and has been sick most of the time since she was eight years old. Two years ago she had diphtheria, and has not been well since. During the attack of diphtheria she had a gangrenous ulcer of the tongue, the scar resulting from which is plainly visible now. During this illness there was a slight menstrual discharge, the first and only one she has had. Some pyorrhea had existed for some weeks before the present trouble came on. Two weeks prior to her entrance to the hospital her face on the right side began to swell and she noticed a "canker" on the inside of the cheek. The cheek was quite sore and painful, and teeth were quite loose. She complained of some difficulty in swallowing. She had been losing weight for a month.

Examination shows a large, immature girl, rather poorly nourished, skin and mucous membranes pale. Cheek is much swollen and glossy, partly closing eye of the same side. Over the most prominent part of the swelling there is a cyanotic area. The whole cheek is tender and hard. On the inside of the cheek, extending from the ramus of the jaw to within a half inch of the corner of the mouth, is an ulcer covered with a greyish-yellow slough. All the teeth are loose, the gums are sore, pus escapes on pressure from around the roots of the teeth, salivation marked, breath extremely fetid. Temperature 99.5° F.; pulse, 116 per minute, regular, but with little volume or force. Patient is not confined to bed, but tires easily and lies down most of the time. Appetite is fair. The urine was found to be normal. The blood examination showed 26,880 white cells, 56 per cent polynuclears, large lymphocytes 9 per cent, small lymphocytes 31.5 per cent, transitionals 2.5 per cent, eosinophiles 1 per cent.

Dr. Rhamy's report on the bacteriologic findings is as follows: "Smears from this case show many short and long bacilli, pointed at the ends and thicker in the middle, which decolorize by the Gram method. There are also present a few streptococci and leptothrix and a moderate number of spirochetæ resembling the spirochetæ dentium. Cultures showed a luxuriant growth of an aërobic bacillus, decolorizing

by Gram, and a few streptococci. This bacillus is evidently that described under the name of bacillus fusiformis and occurs in ulcerative lesions of the mouth." The patient was kept in bed with the windows wide open and during the day she was kept on the porch. She was given a liberal diet, and in addition to the regular meals she was given a glass of milk with an egg and two drams of rum three times daily. She was also given the juice of three lemons daily. Every three hours the mouth was washed with peroxide of hydrogen with the aid of a dropper to insure a thorough washing of the nomatous area. After four days of this treatment there seemed to be some general improvement, the nomatous area had not spread and the cyanosis of the cheek was less marked. I now concluded that we had better substitute a bichloride solution 1-5,000 for the peroxide because of its superior germicidal power. The other treatment was continued. After one day's use of bichloride the pain was greater, and the cheek seemed more swollen. The treatment was not changed, however, until three days later, when, after a talk in Atlantic City where I had gone to attend the meeting of the A. M. A., with Dr. W. A. Pusey, of Chicago, who said he thought the weight of evidence was in favor of the trouble being due to an anaërobic microörganism, and recalling the apparent change for the worse when the bichloride was substituted for the peroxide, I telegraphed Dr. Weaver, my assistant, to stop the use of the bichloride and resume the use of the peroxide. After this the treatment was not changed except that four injections of bacillus fusiformis were given, one of 50 m. on June 8th, 33½ m. on June 12th, 25 m. on June 16th, and 25 m. on June 21st. On the sixth day of her stay at the hospital a diarrhea developed, which was checked by a few doses of opium and bismuth. The ulcer extended until it reached the corner of the mouth, but in no other direction was there any extension of the nomatous process after she entered the hospital. Shreds of necrosed issue were washed away or gently removed by the forceps daily. On my return from Atlantic City I found the patient much improved, both as to her general health and the local condition, save that the ulcer extended to the corner of the mouth. Perforation did not occur. On June 27th (29 days after she entered the hospital, and 42 days after the onset of the disease) she was discharged with the ulcer entirely clean of necrosed tissue and rapidly healing. A few days after her return home there was a slight relapse evidenced by pain, swelling, and a dirty appearance of

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the ulcer, but this soon disappeared and about two weeks later when I saw her the ulcer was nearly healed. She was feeling well, but was still rather easily tired and was decidedly anemic. The pyorrhea was not any better. A slight elevation of temperature most marked in the evening was nearly constant until convalescence was established. On five occasions it was normal in the morning and on one, one-half degree below normal. The highest temperature recorded was 101.8° F. on the 33d day of the illness. The pulse was feeble and ranged from 100 to 116 per minute, save on five occasions when it was recorded at from 84 to 98 per minute. There were no changes in the clinical aspects of the case as a result of the injections of the bacilli. No examinations were made to determine the effect, if any, of the injections of the bacilli upon the blood.

Dr. Reid, the patient's physician, under date of October 1, 1909, writes of the case as follows:

"She came home weighing 81 pounds. She now weighs 102 pounds. She is feeling pretty good and I allow her to attend school half a day; I thought best to not let her go all day.

"The sore is not entirely healed; however, it is much smaller and the adhesions that formed have broken up so the cheek is fairly freely movable. She cannot open the mouth very well, but much better than she did. The gums still recede from the teeth, and the teeth are loose. The breath no longer has the foul odor. The cheek is swollen some, but not enough to attract attention. The red spot on the cheek has disappeared and her color is tolerably good. She has a good appetite. I anticipate complete recovery so far as the noma is concerned.

"The cheek has softened and become more pliable. The cicatrix is less noticeable since the adhesions that formed seemed to give way."

OSTEOMYELITIS

JAMES E. MOORE, M. D.

MINNEAPOLIS, MINNESOTA

Everyone who has a reputation as a surgeon is supposed to be well informed concerning abdominal surgery, but many of them know much less than they should concerning bone surgery; in fact, the sum total of our knowledge of bone surgery is not in keeping with our knowledge of the surgery of the soft parts. Had general practitioners studied the literature at their command there would be no excuse for this paper, for what we know of the subject has often been well written. My only hope, therefore, is to call their attention to this important subject once more, and to add my personal experience in the treatment, and possibly to bring out the experience of this body of surgeons in the way of discussion.

Bone diseases are very common, but the literature is comparatively scant. It is difficult to account for this lack of interest, because there is no field in which a surgeon has a better opportunity to relieve human suffering or to display his skill.

Most writers when discussing inflammations of bone mention periostitis, ostitis, and osteomyelitis. Practically, ostitis does not exist without one or both of the other tissues being involved. Until a comparatively recent date most inflammations of bone were diagnosticated as periostitis, but with the exception of cases in which the periosteum is directly injured and infected, or when the infection extends from the over-

lying soft parts, periostitis is a rare disease. Many lives and limbs have been sacrificed because the surgeon was content with a diagnosis of periostitis and an incision through the periosteum, when the original seat of the disease was in the medulla. Osteomyelitis is now the commonly accepted term applied to bone inflammations; and caries and necrosis, which are the results of inflammation, are no longer described as diseases.

Inflammation of bone is due to infection, just as it is in any other tissue, the added symptoms and dangers being entirely due to the density of the structure. The virulence of bacteria is always enhanced by pressure, and the denser the tissue the greater the danger of necrosis, because of the early interference with the circulation from the products of inflammation, and as soon as part of a bone becomes necrosed the sequestrum acts as a foreign body. While infection is the only cause, many conditions may act as predisposing causes. The greatest predisposing cause is age, for more than half the cases occur between the ages of 13 and 17. It is very evident that the processes of development of the long bones at this age offer a fertile field for the growth of bacteria. Macnamara, who wrote the best book on the disease of bone that has ever been written, described the disease under the name of suppurating ostitis in growing bone. The fact that boys are much more frequently affected than girls is because they are more frequently exposed to the other predisposing causes. It is easy to understand how an open wound of bone may lead to infection. Fortunately, since the adoption of modern methods of wound treatment infections from this source are not nearly so common, and when they do occur they are not nearly so serious. Before the days of Lister the trauma caused by the surgeon was a frequent cause of osteomyelitis.

That contusion of bone is the most common exciting cause of osteomyelitis is well established, but that underlying causes are back of that is evident, because all contusions of bone are not followed by infection, and many so-called idiopathic cases occur with no history of contusion whatever. At present we must be content with the theory that the blood-clot formed in bone after a contusion acts as a *locus minoris resistentiae*, affording the ubiquitous bacteria an opportunity to commit their depredations. When osteomyelitis, as frequently happens, is preceded by a focus of infection elsewhere in the body, the bone infection can be accounted for as a hematogenic metastasis. It is doubtless in this way that typhoid, pneumonia, smallpox, and the exanthemata cause osteomyelitis through their ulcers, suppurating eruptions, and sore throats.

At one time most diseases were attributed to exposure to cold, and this is still mentioned as a cause of osteomyelitis. But, in view of the fact that all boys go in swimming in cold water, sit down on the cold ground and even on the ice, and that only a very small percentage of their total number acquire osteomyelitis, it would seem that there is good ground for scepticism concerning cold as a cause.

It is unnecessary to dwell upon the symptoms of osteomyelitis before this audience, for the sudden severe pain in the diaphysis of a long bone, followed by a chill, high temperature, localized tenderness, high leukocytosis, and other evidences of suppuration, make a clinical picture familiar to you all. Since 1853, when Chassaignac first described "typhus of the bones," the symptoms of osteomyelitis have been well defined. It is almost incomprehensible that this perfect clinical picture, which is as clear to the surgeon as a full moon on a clear night, should be so frequently overlooked by

the general practitioner, but that this is a fact we all know to our sorrow.

The plea of every surgeon is for early diagnosis in osteomyelitis, because with early diagnosis and prompt treatment the majority of patients can be treated with most gratifying success, while without these most attacks after causing untold suffering end disastrously. In most cases the diagnosis is easily made. In exceptional cases the infection is so overwhelming that the patient is insensible to pain, but even in these cases the careful observer can usually make the diagnosis. That mistaken diagnoses are frequently made in osteomyelitis is all the more lamentable because with a proper examination they should rarely occur.

In very young children the diagnosis is not so easy because of the absence of subjective symptoms, and because the infection not infrequently occurs in the epiphysis instead of in the usual seat near the end of the diaphysis. The early invasion of the joint in cases of epiphysitis is also liable to be misleading. Exceptionally acute tuberculosis of the epiphysis bears a strong resemblance to septic epiphysitis, but the pain is seldom so severe, the temperature rarely goes above 102° F., and leukocytosis is quite low or absent. When in doubt these patients should be treated as for osteomyelitis. Every child attacked by severe pain, high temperature and a seemingly helpless limb should be carefully examined for osteomyelitis. The added local heat and tenderness are usually sufficient to establish the diagnosis.

The usual mistaken diagnosis is rheumatism. With only ordinary care this mistake need not occur, for the two diseases really bear very little resemblance to each other. The present generation of doctors are doing better than their predecessors, because they have been taught to examine their patients before making a diagnosis. This one fact, that rheumatism is a poliarticu-

lar disease, should be sufficient to settle the diagnosis. Rheumatism is in the joints while osteomyelitis is in the shaft of the bone. The constitutional disturbance in rheumatism is rarely so marked. It is not a suppurative disease and not characterized by leukocytosis.

There are some exceptional cases in which the differential diagnosis between osteomyelitis and typhoid fever is not very easy, for the patient suffering from osteomyelitis is in the so-called typhoid condition. In these cases blood-examinations are very helpful. Widal's reaction is rarely present before the seventh day, but high leukocytosis develops very early in osteomyelitis. This should lead to a careful search for the local symptoms of osteomyelitis.

The early treatment of acute osteomyelitis is just as much of a surgical emergency as the treatment of acute appendicitis. The diagnosis should be made early and followed promptly by operation. There is no medical treatment for this disease, and poultices and other local applications only lead to waste of valuable time. There is but one form of treatment, and that is a free opening into the medulla. An incision through the periosteum may relieve some of the pain, but it is insufficient because it fails to stop the ravages of the disease. No one need fear that he may cut through a periosteal abscess and infect the marrow, because the marrow is always the original seat of infection. Next to the danger to life is the danger of necrosis. The death of bone is due to the separation of the periosteum and the destruction of the endosteum from which it gets most of its nourishment. By a prompt opening into the center of the bone drainage is established and the life-threatening poison allowed to escape. An efficient opening relieves the pressure, and when made early enough will stop the separation of the periosteum and destruction of the endosteum, thus preventing or limiting necrosis. When the operation

is performed very early a half inch trephine opening may be sufficient. Drill-holes are not to be depended upon, and there is no valid objection to the trephine. In a very early operation no pus may be found, but the medulla is greatly congested and protrudes into the wound. Under these conditions the trephine opening need not be enlarged. Unfortunately, we rarely get a case at this early period. When pus oozes out through the trephine opening, as it does in most instances, the medulla should be uncovered by means of mallet and chisel until healthy marrow is found. Nichols has made a very valuable suggestion concerning the next step in the operation. He advises that the marrow should not be curetted out because by so doing we destroy the endosteum and thus cause necrosis, the very thing we are trying to avoid. The wound should not be plugged with gauze, but the limb should be surrounded with a moist dressing. After a thorough operation of this kind the excruciating pain disappears, the temperature drops, and the patient falls into a restful sleep. When the operation is performed early enough no necrosis follows, and the wound soon heals. When the operation is not performed until after necrosis has taken place, the wound will not heal entirely and the case becomes chronic and requires later operation for the removal of the sequestrum.

Nichols here makes another suggestion, which, judging from his reported cases, is valuable, but with which I have had no personal experience. He advises that the operation for the removal of the sequestrum be made early, in six or eight weeks, while the involucrum is still plastic, so that it can be brought together by sutures, and he demonstrates that a bone will often form which is perfect in size and shape. This treatment is only adapted to bones in the leg and forearm where there is a parallel bone to act as a

splint. In some of his cases nature failed to reproduce sufficient bone to give the requisite strength. The amount of bone to be removed varies from a small segment to the whole of the diaphysis. Nichols gives as a working rule in his operation, which is done before the sequestrum is entirely separated, that those parts of the bone which show no periosteal separation or endosteal thickening may be preserved, the balance being separated by mallet and chisel, care being exercised not to injure the epiphyseal line. The limb can be used in from five to eight months and the function is perfect.

I have been familiar with Dr. Nichols' treatment for some time, but my treatment of the chronic stage of this disease with the help of the Moorhof bone-plug has been so satisfactory that I have hesitated to interfere before Nature had completely separated the sequestrum and until the involucrum was strong enough to take the place of the removed sequestrum, the time of operation being decided by the loosened sequestrum or the evident strength of the involucrum. This operation can usually be performed in three or four months and is eminently satisfactory.

When acute osteomyelitis begins in the epiphysis, as it sometimes does, especially in young children, the infection is liable to be from the streptococcus, and in addition to the danger to life is the danger to the neighboring joint. The indication for treatment here is to make an opening into the center of the epiphysis before the joint becomes involved, being careful always to preserve the epiphyseal line. When the patient is not seen until suppuration has taken place and broken into the joint the case is by no means hopeless, because prompt and efficient drainage of the joint will often be followed by a perfect result. This is to be accounted for from the fact that the early opening into the joint has relieved the pressure and prevented

necrosis of the epiphysis. In some of these cases separation of the epiphysis takes place, especially when the joint has not been promptly drained.

Osteomyelitis when located in the diaphysis is often accompanied by swelling of the adjacent joint, but it is only exceptionally infected. During the past year I have had two patients in whom the whole shaft of the tibia, the epiphysis and the ankle joint were involved when they came under my observation, so that I could not tell the original seat of infection, but in as much as they were fourteen and sixteen years of age, I infer that it was in the diaphysis.

The first of these patients was admitted into the University Hospital when in bad condition, and in spite of free drainage he had secondary foci in the lung and hip-joint, and he finally lost his life.

The second patient was admitted into the Northwestern Hospital on the fifth day of the disease with the ankle-joint, the whole shaft of the tibia, and the soft parts of the leg full of pus, and the lower epiphysis of the tibia necrotic. The epiphysis was removed, and the ankle, soft parts, and shaft of the tibia were freely opened and drained, but after a month's struggle it became necessary to amputate above the knee to save the boy's life.

Chronic osteomyelitis may be the result of an acute attack or may be subacute from the first, when it is very liable to be mistaken for tuberculosis. In those cases following an acute attack an operation should be performed for the removal of the sequestrum as soon as it is separated, which is anywhere from six weeks to four months. An opening should be made through the involucrum just large enough to allow the removal of the dead bone after breaking it into small pieces. An Esmarch bandage should be used, otherwise the patient may lose an unwarrantable amount of blood. The cavity should be thoroughly curetted, washed, and

finally disinfected by heat or ninety-five-per-cent carbolic, the latter being much more convenient and, in my experience, eminently satisfactory. The acid should be left in the cavity for three or five minutes, when it should be wiped out and the cavity thoroughly washed with alcohol, after which it should be dried and filled with Moorhof's bone-wax in a liquid state. The wax quickly hardens at the temperature of the body, after which the periosteum and soft parts are closed in layers by means of chromicized catgut. A dry surgical dressing should then be applied, the bandage being quite snug, and finally the tourniquet should be removed. In most of my cases the wound has healed promptly, and the result has been eminently satisfactory. In many cases some serum impregnated with iodoform will ooze out into the dressings, but this does not prevent ultimate healing of the wound. Occasionally the wax works its way out and has to be renewed. I have repeatedly seen a wound granulate over a bone-plug which had been exposed by gaping of the soft parts.

My experience with the bone-wax is such that I can conscientiously recommend it, for when I have temporarily failed I am confident that the fault was in my technic and not in the method.

Chronic osteomyelitis not preceded by an acute attack may have been due to so mild an infection that it did not suppurate, the result being a diffuse sclerosis of bone. The symptoms are persistent pain with more or less enlargement of the bone. The bone becomes very hard, and the medullary cavity becomes wholly or partly obliterated. The treatment is to chisel a deep gutter throughout the length of the bone, which should be filled with bone-wax as previously described.

Another and more common type of chronic osteomyelitis is that in which the original attack resem-

bled an acute attack, save that the symptoms were not so severe, and in which resolution seemed to have taken place, the final result being single or multiple chronic bone abscesses. These abscesses may remain latent for a long time with occasional attacks of pain, local heat, and tenderness with little or no general disturbance. The history of the case with the local heat and tenderness and sometimes some enlargement of the bone, are sufficient to establish the diagnosis. The *x*-ray has been disappointing to me in these cases. When positive it was helpful, but when negative was liable to be misleading. These abscesses may continue for many years without the formation of a sinus. The treatment is to open the abscess, sterilize the cavity, fill with bone-wax, and close up.

In the use of bone-wax as above described my most trying cases have been so much more satisfactory to me and my patients than the prolonged packing with gauze that there is no comparison.

DISCUSSION

DR. LEONARD FREEMAN (Denver, Col.): I should like to ask Dr. Moore, how, if these cases of osteomyelitis are always central, he explains those instances in which, following inflammation of the bone, we cut down, divide the periosteum, and remove a slight sliver of dead bone from the surface, without a sinus leading down to the center of the bone. Such cases as these are not uncommon. I recall two or three upon which I have operated in the last few years in which only a sliver of bone, as large as the finger-nail, was removed.

Again, in typhoid fever it is a common thing to have periosteal difficulties. These are sometimes purely of a typhoid nature and sometimes otherwise. They may go on for a long time without difficulty and subside; but sometimes the colon-bacillus also existed in the abscess, or other pus-forming microorganisms, and a small sliver of bone separates on the surface, which is finally extruded or taken out by the surgeon, and the case recovers.

I am not inclined to believe, as Dr. Moore does, that practically all cases of osteomyelitis are central.

DR. HARRY M. SHERMAN (San Francisco, Cal.): I would

like to ask Dr. Moore if, in these cases, where there is extrusion of bone-wax, the time which the patient is under treatment is shortened?

DR. ARTHUR T. MANN (Minneapolis, Minn.): We have used the bone-wax a good deal in Minneapolis since I came back from Moorhof's bone clinic in 1904, and with the success which Dr. Moore has reported. We got results in cases in which we did not get them before. There is one case which I related to the Association at Milwaukee which Moorhof treated in my presence, and I think I will repeat it briefly at this time.

He had a case of tuberculosis of the ankle with a discharging sinus, tuberculosis of the astragalus, and part of the os calcis. He made an incision across the front of the foot, put a suture in each tendon, twice, snapped it with forceps, and cut between the two punctures so that the tendons would match when brought back by pulling up the sutures. He dislocated the foot downward, removed the astragalus and one-third of the os calcis, and removed carefully with scissors and curette all the diseased tissue. Then he used all the care possible to get the parts clean and dry. He cut out the original sinus; put the foot back in place, drew all the ligatures tight and the tendons all tight, and filled the cavity with his bone-wax, which at that time contained too much iodoform, I think. He put in a short piece of rubber tubing, about half an inch long, into the sinus. He said, "I do not believe we shall need this, but we will put it there, as some drainage may be required. I expect this man to walk with a movable ankle, with about one-half inch shortening." After he finished operating that morning he showed me *x*-ray pictures of a similar case in which the operation was almost identical. The same amount of tissue was removed from the case in which the *x*-ray pictures were taken at successive periods from the time of the operation up to the time the bone-wax was practically gone. At the end of the first two weeks the bone-wax stood like a plug of lead. At the end of the next two weeks it appeared irregular at the edges, and two weeks later was quite worm-eaten in appearance. At the end of eighteen weeks the wax was gone, except a slight streak, such as one might make with a lead pencil. That man was walking on a movable ankle with half an inch shortening at the end of the first six months.

These were cases in which we used to do amputation! The bone-wax, as he used to use it, consisted of sixty parts of

iodoform, but that has been changed, and we find it better changed to twenty parts of iodoform, forty parts of oil of sesame, and forty parts of spermaceti.

The wax can be placed also in a cavity which is open on top, and I have also seen granulation-tissue cover over the wax and leave the wax inside with the outside closed over by this tissue before the cavity is filled with tissue.

If this method of treatment did not do any more than prevent the pain and trouble of constant packing, which was the old treatment of these cavities, packing with iodoform gauze and pulling the packing out and re-packing the cavity again,—those things are enough to induce us to use it.

DR. CHARLES H. MAYO (Rochester, Minn.): I am sure we are all able to learn a great deal in bone-work from Dr. Moore. He devoted many of the earlier years of his work to orthopedics and the surgical treatment of children, and much of it represented the neglected bone-work of the Northwest. I have learned a great deal about bone-surgery from him, and I am thoroughly in accord with his treatment.

I have seen some of the work to which he has alluded done in Boston, and for a time we undertook what he speaks of as early operation in cases of acute osteomyelitis where the patients would come in so early that it would be impossible to determine how much bone would die in a given case. We would remove the whole shaft, saving the periosteum, and moulding it back, believing we were accomplishing results which, I am sure, were slower in the double bones, that is, in the tibia and forearm, than if we let nature do more work in separating living from dead bone and making two operations. I saw cases in the femur where there was an enormous amount of difficulty in trying to maintain a direct line of the femur that was as soft and as flaccid as a piece of rubber, trying to keep it the full length under constant traction.

With regard to the use of the Moorhof bone-plug: We have employed it with a great deal of success. There is one thing he speaks of I have noticed, namely, when we failed to secure primary healing of the Moorhof bone-plug, the patients were still better off than under the old methods of packing. If the plug comes out or works out, the patient is better off because the case will end sooner than under the former methods of treatment. The cavity is to be filled with something. We expect granulation-tissue to eat up the plug and fill the space. A mistake has been made in that as soon as it was filled with granulation-tissue and had nearly ceased

to discharge, the surgeon took a curette and cleaned out the cavity which has been nearly filled; in other words, it is half filled with granulation-tissue, and he destroys the work of weeks and weeks, nature having three-quarters filled the cavity with just what he was waiting for, but because it was not completed he cures the whole thing out. If he refills the cavity again with the Moorhof bone-plug or uses the bismuth-paste effect, and does not try to destroy the work that nature has almost accomplished, but has failed to fully complete, the object will have been accomplished.

DR. JOHN P. LORD (Omaha, Neb.): I have been imitating Dr. Moore for several years, and I want to lend testimony to the value of his method. I find this particularly applicable in children because I early became disgusted with the method formerly in vogue of packing large cavities with gauze and replacing it from time to time. I have been using the Moorhof bone-plug. I have also been using bismuth paste. I used bismuth to a limited extent, but after having witnessed several cases of poisoning in other more extensive conditions I have become more conservative about the use of bismuth. I think it will do better under other conditions, but as has been emphasized by the previous speaker, I think these cavities can be more advantageously treated with other things than with the old customary gauze packing.

DR. MOORE (closing the discussion): I wish to thank the gentlemen who have participated in the discussion. Dr. Freeman asked why we find superficial necrosis in all cases of osteomyelitis beginning in the medulla. I would simply suggest that Dr. Freeman's cases were those rare instances of periostitis. I do not think they were cases of osteomyelitis. When it was first learned that it was acute osteomyelitis in these cases I was after, it took all the courage I had to cut down to the periosteum and find pus and go on into the medulla, because I had been taught that the medulla was too dangerous a proposition to approach, as the old surgeons used to think the peritoneum was. But, gentlemen, I have never been sorry in any case that I went through to the medulla. I am satisfied the cases of Dr. Freeman were exceptional cases of periostitis, which are common in typhoid-fever patients and in colon-bacillus infection, etc. About all the cases of periostitis we get are cases of that kind.

Dr. Sherman asked if the treatment is shortened when the wax is extruded. It is made more comfortable, and it is

shortened if you bear in mind the point brought out by Dr. Mayo, namely, if you do not destroy what nature has already done, i. e., if you let the granulations remain, clean them up, and put some more wax in, but do not scrape all the granulations out. If you do this you will lose time—you will get along as slowly as with the gauze packing.

DR. COFFEY: If you had a cavity filled up with granulations, and had not used wax, would you feel warranted in scraping out the granulations?

DR. MOORE: I should be afraid of infection. I might clean the granulations. In cleaning the cavity I have been satisfied with the use of gauze with the alcohol. I have put in ether occasionally, but at the present time I am quite content by wiping thoroughly with gauze. I think that is why my plug stays satisfactorily.

Dr. Mann laid stress on the comfort of this treatment, saying that that of itself is sufficient to justify the use of wax over the old method. I agree with him; and I am constrained to refer to what Dr. Lord remarked, that he was almost ready to give up the treatment of cases in children when he had to continue packing these cavities. The consequence was that under the old methods of treatment a lot of bone cases were neglected, simply because you could not antisepticize the parts week after week to change the gauze, and the parents would not stand for that barbarous and old-fashioned treatment, so that with the use of wax many cases were treated successfully that formerly were neglected.

Dr. Mayo mentioned the use of Beck's bismuth paste. I have used that some, but I find Moorhof's wax stays better than the paste. The paste is too soft. The vaseline part of the paste melts and comes away, whereas the wax remains better.

INTRADURAL TUMOR OF THE CORD

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I am led to make the following brief report of an intradural tumor of the spinal cord, not because the case in itself presents any features of unusual interest, but, rather, because it is illustrative of a class of lesions which, it is believed, will be forced upon our attention in the future in increasing numbers as a result of a constantly expanding knowledge of their symptomatology on the part of those who will first be charged with the responsibility of interpreting, in terms of pathology, their earlier symptoms.

The patient, F. P., aged 48 years, of Bohemian parentage, was referred to the medical service of Dr. L. W. Bierring at the University Hospital, June 22, 1909, by his physician, Dr. J. B. Mullen, on account of paraplegia and associated disturbances.

Family History.—Father and mother died in old age (about 70) of causes unknown. Two sisters and one step-brother are living and well; and none are dead. No evidence of any hereditary taint is obtainable.

Personal History.—The patient is a farmer, married, and has five children, all of whom are well. He has no recollection of having suffered any injury or illness till the onset of his present trouble, which manifested itself in April, 1908. He began to suffer from pain in both of his feet, and it continued during

the summer. The pain became more aggravated, and in the early part of the autumn he began to suffer from pain in the lower portion of his back. During this period he was treated for rheumatism. In the latter part of 1908, his limbs had become weak and his gait uncertain, as he expressed it. At the time of admission to the hospital there was complete paralysis of the lower extremity, both motor and sensory. There was absence of knee-jerk and the Babinsky reflex. The limbs were much reduced in size, and the muscles soft and flabby. The abdomen was distended below the umbilicus, the muscles of this area being paralyzed, so that when he made an effort to raise the body from the bed the umbilicus would be drawn upward for about one and one-half inches. Disturbed sensation appeared on a line about one inch below the umbilicus. The sphincters were nearly completely paralyzed. No other abnormalities were discernible. A diagnosis was made by Dr. Bierring of a spinal tumor involving the 11th thoracic segment. This view was concurred in by Dr. Hugh Patrick, who saw the patient with Dr. Bierring on a visit to the hospital. The patient was transferred to the surgical service for removal of the tumor, which was undertaken July 13, 1909.

Operation.—The patient was placed in a prone position and the back slightly arched by pads placed under the thorax. Ether anesthesia was employed. The spinous processes of the 8th and 9th thoracic vertebræ were exposed by a median incision, extending from the tip of the 7th thoracic spine to one-half inch below the tip of the 9th thoracic space. The muscular structures were separated from the process and the muscular structure well retracted, exposing the laminae of the 8th and 9th thoracic vertebræ.

The spinuous processes of the 8th and 9th ver-

tebræ were removed by bone-cutting forceps, and the laminæ on each side were drawn out with small rongeur forceps. The dura which was thus exposed opposite the bodies of the 8th and 9th vertebræ appeared to be in every respect normal.

Palpation of the exposed portion of the dura and cord revealed no evidence which could be accepted as positive of an increased intradural tension. A careful inspection of the spinal canal showed that the pressure did not have its origin from without. It was therefore concluded that an error had been made in localization; consequently the spinous process and the laminæ of the 7th thoracic vertebræ were removed; the dura and its contained cord yet revealed no abnormality on inspection, the size being uniform throughout the whole portion exposed.

Palpation of that portion of the cord exposed by the last removed vertebral structures gave me the clue to the location of the tumor, for, as I carried the tip of my finger lightly from above downwards over the exposed portion of the dura and cord, I could recognize a slight increase in the intradural tension over the site where the tumor was subsequently found, namely, opposite the inter vertebral disc and adjacent portions of the bodies of the 8th and 9th thoracic vertebræ, so that the tumor area was adequately exposed prior to the removal of spine and laminæ of the seventh vertebra and I admit that it was an operative error to have removed those structures, for I should have had more confidence in the localization of the tumor, as determined upon prior to the operation, and should have at once opened the cord membranes after I had determined that the growth did not arise from without.

The dura was opened in the median line, and as soon as the subdural space was opened a considerable quantity of liquor escaped. When this had

ceased, the incision was enlarged to about $4\frac{1}{2}$ cm., and nothing abnormal was yet observed. Even this exposure failed to reveal anything abnormal, for the arachnoid membrane bulged into the wound like a delicately distended bladder. This was nipped with a pair of scissors and its contents allowed to escape, and after it had settled down closely upon the cord there yet appeared nothing abnormal, except that the cord seemed to bulge slightly backward. The arachnoid was now divided to the extent of the dural wound, and the cord gently rolled to the right side when there rolled out from in front of it, and now lying by its left side, the tumor, which was of oval shape, about the size and shape of an almond, from the upper part of which there extended a delicate pedicle to some point of attachment anterior to the cord. Whether that point of attachment was from the cord structures or its membranes I am not able to state, as gentle traction with a pair of forceps severed it from its attachment. The pedicle was approximately 2 cm. in length. The growth after its removal had very much the appearance of a nasal polypus. No appreciable bleeding followed its removal, and the spinal fluid escaping was hardly stained.

After the removal of the tumor there existed a marked contrast between the cord above the seat of compression and that at and below the site of compression, which was appreciable both upon inspection and palpation, the cord being much larger and more resistant above the tumor site.

The patient tolerated the operation well, there being but slight, if any, shock. The management of the wound consisted in closing the dura by means of fine catgut sutures, while the muscular structures were brought together by heavier sutures, and the skin closed with fine silkworm-gut sutures. A small

drain, consisting of several strands of silkworm gut, was employed in the lower edge of the wound. The wound-repair took place without any local or constitutional disturbances and was completed and cuticular sutures removed on the tenth day; and on the eighteenth day the patient was removed to his home, there having been no improvement of his cord symptoms during his stay at the hospital. On the other hand there had been no aggravation of his symptoms, so it is inferred that there existed no local disturbances at the site of the growth, resulting from the operative interference. He died at his home the latter part of October, 1909, or three months after the operation, of systemic infection following the dicubitic ulcers which developed. The pathological report, made by Prof. Albert, pathologist of the University, showed the tumor to be a glioma.

This case cannot be viewed as successful except in so far as the localization, finding, and removal of the tumor, and removal from the immediate effects of the operation are concerned, for there was a failure of restoration of the normal, which might have been expected, certainly at one time in the course of the case. There was one factor lacking to success, namely, a cord which was not the seat of a marked compression myelitis. It would therefore seem that the failure of success in this instance was due largely to a failure to institute operative interference at a sufficiently early period. A perusal of the literature bearing upon this topic indicates that a tardy surgical interference is largely responsible for the unsatisfactory results which have hitherto attended our efforts in such a large percentage of cases.

Recent conservative estimates place the percentage of partial and complete recoveries after operations as not over 50 per cent. This is certainly far from the ideal voiced by M. Allen Starr fifteen years ago,

who, after an analysis of 123 cases of tumors of the cord, argued that an early diagnosis of spinal tumors was possible and that approximately 75 per cent of them were susceptible of successful removal through operative procedure, which in itself was possessed of no great danger, yet, Cushing, ten years later, was able to collect only eleven cases (including his own) in which a complete recovery had taken place in the sense that there was a complete restoration of cord-function. This cannot be considered as a brilliant showing for the period intervening between 1887, when Horsley successfully removed an intramedullary tumor which Gowers had previously diagnosed, and 1904, when the above report was made. It must, however, be stated that during the last five years marked progress has been taking place in the matter of early diagnosis and operation in these cases, for last year Williamson was able to report 51 cases of spinal tumors operated upon in which there had been a complete, or nearly complete, restoration of cord-function. This represents a recovery in about one-third of the cases as Flatau and Zylberblast, during the same year, estimated the number of published cases of extra medullary tumors which had been operated upon at 136. It is believed that many unsuccessful cases have not found their way into literature, a statement which will no doubt also hold true as to some successful cases. If we may accept Starr's views to the effect that 75 per cent of such tumors may be successfully removed, and statistics reveal that we are only meeting with success in 33 per cent of cases, then the conclusion must be that 42 per cent of these cases are mismanaged.

If we would avoid the errors implied by such mismanagement it may be well to consider where they are most easily made.

Diagnosis.—First.—It is in respect to the interpre-

tation of the early symptoms, and even late symptoms, resulting from disturbances of cord-function, that error is most likely to appear. While most neurologists state that an early diagnosis is readily made and no doubt this is true in their hands, yet in the hands of the general practitioner less experienced, the task may be far from easy, unless the irritative and paralytic symptoms are at first referable to a part of a spinal cord segment. Even under such conditions it must often occur that the neuralgic pains, hyperesthesia, and muscular spasms may at first receive a different pathological interpretation. When the hyperesthesia, muscular spasms, and rigidity are being replaced by anesthesia, muscular weakness, and paralysis, especially if the same is of the Brown-Sequard type, there can no longer exist any doubt as to the cord being subjected to pressure, and it becomes only a question of determining the cause of such pressure. The only lesions at all likely to bring confusion would be those occasioned by a chronic inflammatory process in the adjacent osseous structures extending to the membrane, that is, tubercular caries, etc. If this could not be otherwise excluded, the *x*-ray would undoubtedly render material aid.

Localizing the tumor as to the cord-area is of course essential to operative success, but offers little difficulty after the presence of the growth is recognized. Dr. M. Allen Star and Percy Bailey rely explicitly upon the rule laid down by Horsley, to the effect that a point four inches above the line of beginning anesthesia will mark the location of the tumor.

Prof. Oppenheim, in a paper presented upon this topic at the International Congress of Medicine last summer, pointed out that this segmental diagnosis of spinal tumors may be complicated by a secondary serous or fibrous meningitis, and as a consequence the

symptoms of the tumor may be referable to a level below the seat of the tumor.

A determination of the relation of the tumor to the cord and its membranes, namely, as to whether it is intramedullary or extramedullary, and in the latter instance whether it is intradural or extradural, is but rarely possible prior to exposure. Nor may we hope to determine the character of the tumor, and this, by the way, has no doubt led to some of the unsatisfactory results in the cases heretofore operated upon, owing to the presumption that the growth was of luetic origin, and consequently subjecting the patient to an antiluetic treatment, thus losing much valuable time during which the cord will suffer from a constantly increasing degeneration.

It is to be hoped that the Wasserman test will fulfill its promise of giving us a sure means of avoiding this error. Dr. Allen Star reports a case during the summer where this test had been utilized and relied upon for the exclusion of syphilis.

In the matter of the operative procedure, it is readily understood how the boundaries of safety may be encroached upon in various directions so as to jeopardize the patient's prospects of recovery. In general it may be said that success will be proportionate to one's ability to meet the ideal, namely:

First.—Minimizing the shock by—

- (a) Limiting the field of operation as far as possible. This will imply the removal of the laminae of two or at most three vertebræ at the site of the growth.
- (b) Limiting the time of operation to that which is compatible with careful work.
- (c) Limiting the loss of blood.
- (d) Limiting the escape of cerebrospinal fluid by having the head well lowered.

Second.—Not overlooking the growth.

- (a) After the spinal canal is opened inspect the

extradural space to note whether the growth has its origin here, if not

(b) Open the dura and arachnoid for inspection of their spaces, if the growth is yet not in view.

(c) Roll the cord gently to one side or the other so as to disclose any tumor possible lying in front of it, as in this case. If none is here, the tumor must be intramedullary or at a higher or lower level. If intramedullary the cord would probably be more or less enlarged at that site. If there is an error in localization one must be guided as to the direction of the tumor by the cord-findings at the point of exposure.

Third.—Damaging cord.

This must be avoided by disturbing it as little as possible.

Fourth.—Perfect hemostasis.

This is to be secured before closure of the dural wound, as well as of overlying structures, or the clot by compressing the cord would lead to further damage.

Fifth.—Perfect asepsis must be secured for similar reasons. In conclusion, I would say that with an early diagnosis, and patient coming to operation before grave cord-changes have occurred, and with the perfected technic of operative procedure of the present, we may confidently look for a constantly increasing number of gratifying results in these cases.

DISCUSSION

DR. SAMUEL C. PLUMMER (Chicago, Ill.): Although my experience in tumors of this kind is limited to one case, still I think there is something to be learned from one report. I was very much struck with Dr. Jepson's history of his operative experience. It almost seems as if I might have written his paper myself in describing my own experience where the tumor was also in the thoracic region, but higher up. I did, as Dr. Jepson did, examine the cord through the dura mater,

and could not find anything, and then I did just as he did, took out the laminae of the vertebra above and did not find anything, so I took out laminae of the vertebra below. My case has been fully reported by Dr. Julius Grinker, who made the diagnosis and reported the case at the last meeting of the American Medical Association. His report was published in the Journal of the American Medical Association, Vol. LIII, No. 15, p. 1150. Oct. 9, 1909.

Some of the surgeons in discussing the case said I took out too many laminae. I certainly did. The lesson to be learned from this case is, that the localization of one of these spinal tumors is very accurate. It is a different proposition from a brain tumor, where the localization is uncertain, but the localization of one of these spinal tumors is accurate. What I ought to have done was to have had more confidence in localization, and if we do not find anything on palpation or inspection of the cord through the dura mater, open in the place where the tumor ought to be. We did that eventually, and we found the tumor where it had been previously located. That is a very important lesson for anybody who has one of these cases to operate on. Do not hesitate to open the dura mater because you do not find anything there on palpation or inspection.

These cases should be operated on early. The case which I had had been under Dr. Grinker's observation previously in another hospital. He had made a diagnosis of tumor of the spinal cord, and he urged operation, which was refused. For several months the patient was given anti-syphilitic treatment, although there was no sign of syphilis in the case, and the patient came under my care in another hospital. I learned then that Dr. Grinker had seen the case. I urged operation, and it was promptly done. In my case there was partial recovery, even of the motor symptoms, with complete recovery of the sensory symptoms, and if the case had been operated on when the diagnosis was first made the chances of complete recovery would have been very good.

DR. LEONARD FREEMAN (Denver, Col.): Some twelve or thirteen years ago I operated upon a case of intradural spinal tumor. At that time it was the second case ending in complete recovery, the first case being that of Dr. Horsley. I am able to report the subsequent history up the present time.

The diagnosis was made by Dr. Eskridge, of Denver. The tumor was placed somewhere in the region of the fourth or

fifth dorsal vertebra, but the exact point I am unable to state at this time. Like the previous speakers who have reported similar cases, I opened the spinal canal too low and finally had to take out the laminae and spinous process of the vertebra above, which made an unnecessarily large wound. The tumor was about the size of an ordinary oblong grape. It lay posterior to the cord, was easily removed without hemorrhage, and the pedicle came from the arachnoid. I did not sew up the dura. I should like to call attention to the fact it is unnecessary to spend what is sometimes extremely valuable time in sewing up the dura. I have never done that in any of the operations I have made upon the cord, and have never had cause to regret not doing so.

The case was that of a boy of eight or nine years of age. He has developed since into a large and perfectly strong man although he had complete paraplegia before the operation, with everything that goes with it, below the site of the tumor; nevertheless, he recovered absolutely, so that it would be hard to tell that he had ever had anything wrong with his spinal cord. He became a member of a baseball team and secured some local distinction on account of his playing. He has been a hard working man ever since. This state of affairs persisted for about eleven years or a little over. About a year ago he developed a weakness in his right limb, which did not bother him very much, and under the treatment of Dr. S. D. Hopkins, a local neurologist, the weakness soon disappeared to reappear again a few months ago. It is now apparently getting better again. Dr. Hopkins attributes this to some thickening of the dura, perhaps where the nerves are given off.

In this particular case the operation was not done very early, but a good many months after the paraplegia appeared. Unfortunately, I am not able to state at the present time the exact number of months.

I have the specimen of the tumor, and you can see the size and the pedicle by which it was attached. It was a fibro-glioma.

DR. MAJOR G. SEELIG (St. Louis, Mo.): It seems there is room for a word of consolation to Dr. Jepson. The essayist and the gentlemen who have discussed this paper have laid stress on the importance of operating for the removal of these tumors, but at the same time in his remarks I noticed that Dr. Jepson appends the report of the pathologist stating that the tumor in question was a glioma. When I ask my

students to name a typically infiltrating tumor, I expect them to answer glioma; and possibly of all tumors there are none more exquisitely infiltrating than the gliomata. I do not know for a certainty, but I believe that there is no case on record of an absolutely pure glioma whose removal has been followed by recovery, whether it has been taken out early or late. If macroscopically the characters of the tumor are such that one is warranted in making a diagnosis of glioma on the operating table, the most prudent course to pursue is not in any way to attempt its removal. Such being the case, it is only fair to assume that if a glioma of the brain is operated on in its incipency, the case would still go on to a fatal issue. That statement, however, does not militate against the fact that brain tumors should be taken out as early as possible. The operation for an intracranial new growth, is, with certain limitations, always imperative, and it can be laid down as an axiom that when an imperative operation is to be done, it is also imperative that it be done at the earliest possible moment.

DR. JEPSON (closing the discussion): I have nothing to say except to thank the gentlemen who have been so kind as to discuss this case. I knew that Dr. Plummer and Dr. Freeman had had such cases, and they were included in the papers I referred to, and I was sure I would get from them some additional points that would aid me in the management of such cases as may arise in the future.

I made an error in removing too much of the laminæ. I removed the extra laminæ, and that was unnecessary. This was due to the fact that I thought I would be able to recognize some change in the cord-structure covered by its membranes of the presence of the tumor before opening it. That is a lesson I have learned I was not able to do. I should have had explicit reliance on the localization of the tumor, and I erred in not having it.

I am, furthermore, glad to know of the point Dr. Freeman makes, namely, that it is not advantageous or even necessary to suture the dura. Upon reflection I realize that, in a sense, it must be true because, probably but rarely, do we sew it so tightly but what it would leak. On the other hand, it would permit fluid to escape, although it might not have any effect whatever upon the intracranial or intraspinal tension; yet, on the other hand, if there should be hemorrhage from the site of the removal of the tumor that would be carried away

and not become a factor in the subsequent management of the case.

A further remark as to the character of the tumor: We realize that we are often going to meet with tumors here that are malignant. I think, however, we all agree that, where we are in doubt, in other words where there exists evidence of pressure on the cord, we should subject that part to exposure and relieve it by direct interference as soon as possible. In short, an exploratory operation should be made, if nothing better.

OPEN OPERATION FOR CONGENITAL LUXATION OF THE FEMUR

BENJAMIN MERRILL RICKETTS, M. D.

CINCINNATI, OHIO

While congenital dislocation of the femur was known and commented upon by Hippocrates, Galen, Avicenne, Paletto (1783), Dupuytren, Caillard, Biloniere (1828), Breschet (1834), Lehoux (1834), Pravaz (1835), and Weger (1836), direct radical means for its correction were exceedingly limited. The literature upon the subject has now become voluminous with its etiology, pathology, and reports of cases demonstrating the various surgical procedures for its relief.

Its etiology, like the pathology, occupied the minds of the earlier masters, just as it does those of today, with quite as much uncertainty.

The causes assigned are many, and are mentioned in the following order, with their advocates, respectively:

Intra-uterine trauma. (Hippocrates, Cruvillier, Petit and Barth.)

Trauma during delivery. (Phelps, Broadhurst, Adams and De Outreport.)

Flexion of the fetal thighs, with excessive pressure of the head of the femur against the posterior portion of the rim and capsule. (Dupuytren.)

Hydrops of joints. (Pravaz, Pare and Malgaigne.)

Muscle contractures from defects of the nerve-centers. (Guerin.)

Imperfect development of bones. (Guerin and Braschet.)

Abnormal pressure upon a too oblique pelvis. (Kuckenberg.)

Paralysis of the hip muscles. (Vernuil.)

Disturbances in growth and development or too early ossification of the acetabulum. (Dollinger.)

Abnormal ligamentum teres. (Tillman.)

Maldevelopment of Y-shaped cartilages; degeneration. (Grawitz.)

Vitium primæ formationis; germ defects (Heusner, Paletta) or due to inheritance from father or mother. Hirsch says that static treatment has disproven the germ theory, while Volkman, Bouvier, and Broca have proven that luxatio paralytica has nothing to do in common with luxatio congenita.

Rosen attributes the cause of congenital dislocation to adduction *in utero*, and says that the male escapes it because the testicles become pinched by excessive adduction, and this causes reflex abduction.

Hofmohl and Valleta say that uterine contractions produce fractures, but never dislocation. This, however, is denied by Lorenz, Dupuytren, Scharz, Drehman, Cardivilla, Bender, and Rosen, who insist upon it being due to excessive intra-uterine pressure, due to lack of liquor amnii, and long-continued extreme flexion of the femur. The difference between the male and female pelvis causes the familiar disproportion between sexes. The inheritance of this deformity is to be explained by the inheritance of the local intra-uterine conditions.

Gordon says that "the term congenital is wrong, as the luxation is not present when the infant is born, but develops later, sixteen, eighteen, twenty, or even



Fig. 1.



Fig. 2.

twenty-two months after birth, as soon as the child commences to be about."

Treatment.—It matters not what the etiology may be, the remedial principals are the same with all.

Lampugnant, 1885, performed decapsulation with most gratifying results.

Adams, 1885, reported a case which was cured by two years' recumbency with extension by weight and pulley. He also reported his findings in the specimens of congenital dislocation of the head of both femurs sent to London by Carrochan of New York City.

Kirmisson (1894) operated by osteotomy. Keetley (1896) and Herczel (1897) operated by open division of all resisting soft structures, and Blodgett (1902) by excision of the head.

Excision of the head when congenitally dislocated should be done when the opposite joint has normal position, motion, and length, or when the position and motion are normal without the length being normal.

It is not the province of this paper to deal with methods for the correction of congenital luxation other than by direct fixation through an incision. The principal features for discussion will therefore be the minimum age-limit for such a procedure, the methods of choice, and the comparative value and safety from death and accident of the open and unopen operations.

The open operation has less mortality and shock, while the prevention of fracture and hemorrhage is absolute and paralysis almost eliminated.

The high percentage of mortality, fracture, hemorrhage, shock, and paralysis is sufficient to justify the open method in all cases of single dislocation in patients more than seven years of age. When both heads are dislocated, this age or more, the double open operation should be done, with the hope that position, motion, and length may become normal. If such

a result is not attained, then the next thing to hope for would be ankylosis of one with motion of the other. Such a result may be secured with or without removal of the two heads.

One of the three following groups of conditions usually results from one or more of the open operations:

Unilateral dislocation with preservation of the head.

	Position	Normal
1st	Motion	Normal
	Length	Normal
	Position	Normal
2d	Motion	Abnormal
	Length	Abnormal
	Position	Normal or abnormal
3d	Motion (lost)	Ankylosis
	Length	Abnormal

Unilateral dislocation with removal of the head.

	1	Position	Normal
1st	2	Motion	Normal
	3	Length	Normal
	1	Position	Normal
2d	2	Motion	Abnormal
	3	Length	Abnormal
	1	Position	Normal or abnormal
3d	2	Motion	Lost (ankylosis)
	3	Length	Abnormal

Bilateral dislocation with preservation of the heads.

	1	Position	Normal
1st	2	Motion	Normal
	3	Length	Normal
	1	Position	Normal
2d	2	Motion	Abnormal
	3	Length	Abnormal
	1	Position	Normal or abnormal
3d	2	Motion	Lost (ankylosis)
	3	Length	Abnormal

Bilateral dislocation with removal of the heads.

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	3	Length	Normal
	1	Position	Normal
2d	2	Motion	Abnormal
	3	Length	Abnormal
	1	Position	Normal or abnormal
3d	2	Motion	Lost (ankylosis)
	3	Length	Abnormal

CONGENITAL UPWARD AND BACKWARD DISLOCATION OF
THE HEAD OF THE RIGHT FEMUR

Miss R., white, aged eight years, weighed 65 lb., fairly well nourished, and family history pertaining to deformity, negative.

As the muscles parallel to the femur are shortened in proportion to the amount of dislocation, the pelvic trochanteric and pelvic femoral muscles lengthened; the pelvic crural group shortened; and the pelvic crural group are the chief obstacles to successful reduction of such dislocations, without incision or by dividing the pelvic crural group alone, the following procedure was adopted in her modest home June 23, 1909, and the after-treatment directed by the family physician, Dr. J. N. Rankin, of Winchester, Ky.

Under chloroform narcosis an attempt with reasonable force was made at reduction without incision. This having failed, an incision was made parallel with, and posterior to, the shaft, extending six inches from a point overlying the tip of the great trochanter before reduction. All of the periosteum was detached from the entire circumference of the femur for a distance of six inches from the trochanter. The ligamentum teres was absent, though usually normal at birth, but becomes hypertrophied and disappears during the third year. The capsule was stretched into a tendon-like

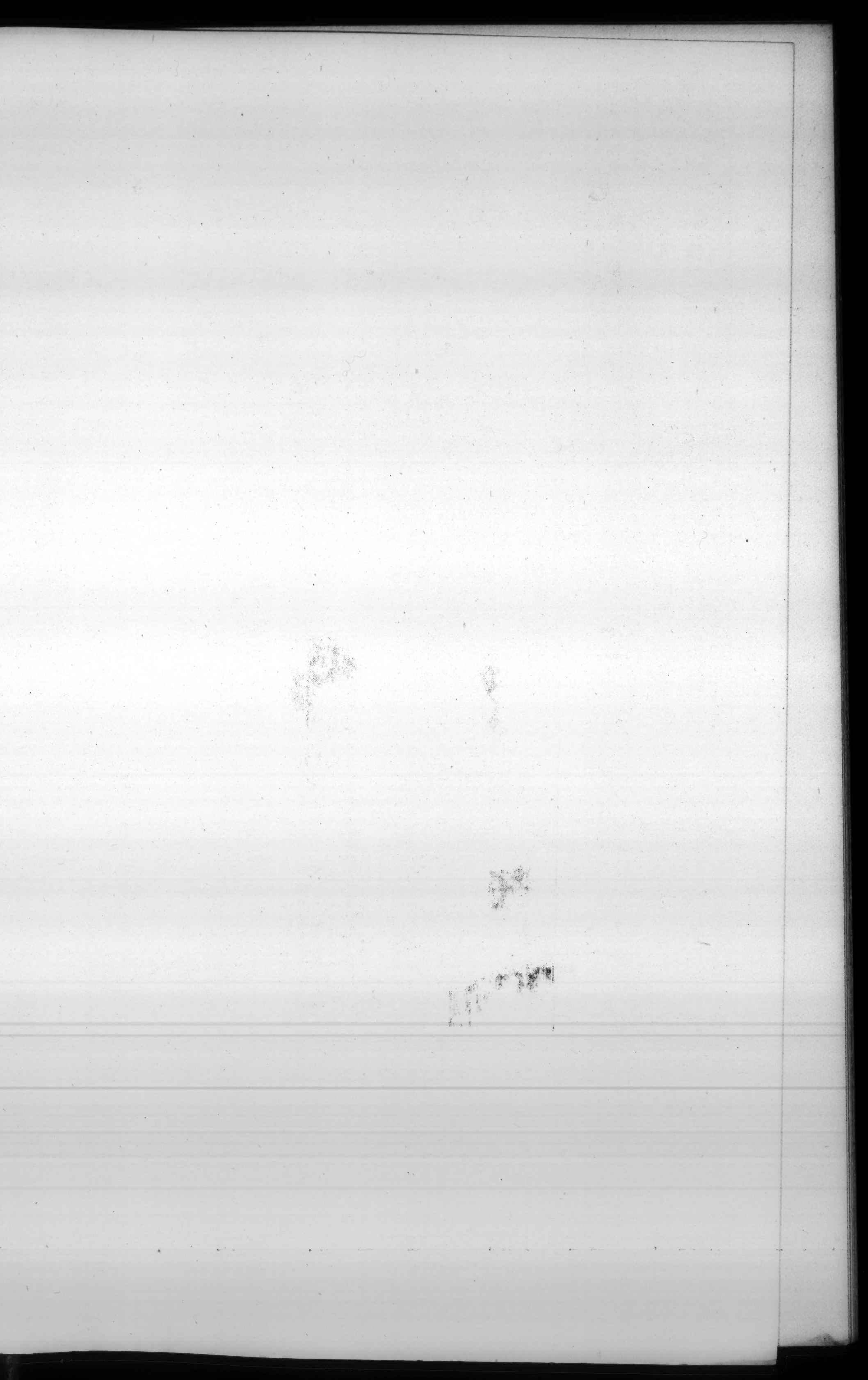
tissue, while the synovia was unchanged in character and amount.

The capsule, together with all resisting tissues, was divided as close as possible to their attachments, and extension made upon the leg until the head rested at a point corresponding with that of a normal acetabulum. There being not a vestige of the acetabulum remaining (though Lorenz says that this seldom occurs), and the rim anteriorly absent, though he says it is always present and sometimes hypertrophied and the head greatly atrophied and irregular in shape, little hope was entertained that permanent fixation with preservation of the head could be accomplished. The head was therefore removed. By dividing the very much shortened neck near the shaft with the severed attachments of the tendons about the trochanter and upper femur there was no difficulty in maintaining the proper position of the leg.

A drill was made to pass through the shaft and remaining portion of the neck into the bony structures corresponding to the location of the acetabulum.

A metal wood-screw, three and one-half inches long, was forced through the drill opening and its head left projecting through the incised opening in the overlying soft structures. This procedure firmly fixed the femur in its proper position. The screw became loosened during the sixth week and was removed on October 1st. During all of this time the body position was prone upon the bed, and the leg kept in a box with one or two pounds weight and pulley until August 13th. The wound remained aseptic with tape drainage and simple gauze dressings kept in place with adhesive strips and changed as necessity required. But little trouble accompanied the after-care. She began the use of crutches September 1st, having remained in bed until August 15th.

The condition of the leg six months after the opera-



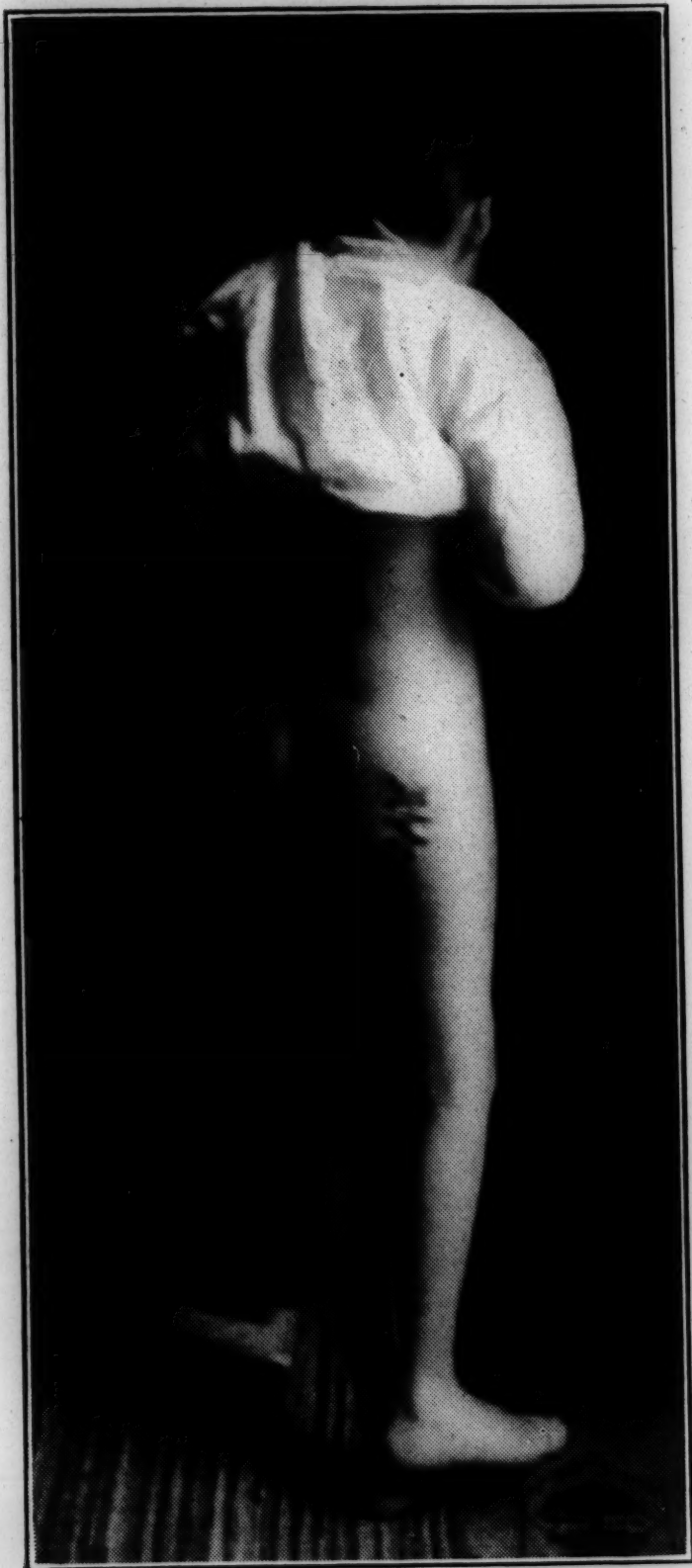


Fig. 3.

tion is as follows: Position, illustrated in photographs; shortening, not more than one inch; motion, excellent without flail.

CONGENITAL DISLOCATION OF BOTH FEMURS WITH SPINA
BIFIDA

M., white, aged 5 weeks; first-born to Hebrew father and mother; patient of Dr. Terwilliger, of Lima, Ohio. Successful radical operation for the spina bifida at the age of thirty-five days, a healthy well-developed child with the exception of the double dislocation at the age of six years. No radical operation has been done to correct the deformity at this age.

Ferguson, A. H., (personal communication) states that he has devised a method by which the head of the femur is held in its proper position by an osteoperiostial flap taken from the ilium with its pedicle above the acetabular location. This flap is sutured over the trochanter, neck and head, to act as a bulwark. He has done one in this way with most gratifying results. This operation seems destined to solve some of the perplexing problems pertaining to the open operation for congenital dislocation of the head of the femur.

CONCLUSIONS

1. The open operation is applicable to all after the third year.
2. One or both heads may or may not be removed.
3. The head may be held in place by means of a screw or nail or by an osteoplastic flap, as suggested by Ferguson.
4. The dangers, such as fracture, hemorrhage, tetanus, paralysis, and shock, incident to reduction by the unopen method, are all avoided by the open method.
5. The percentage of imperfect results, such as redislocation, ankylosis, shortening, and a pendant mem-

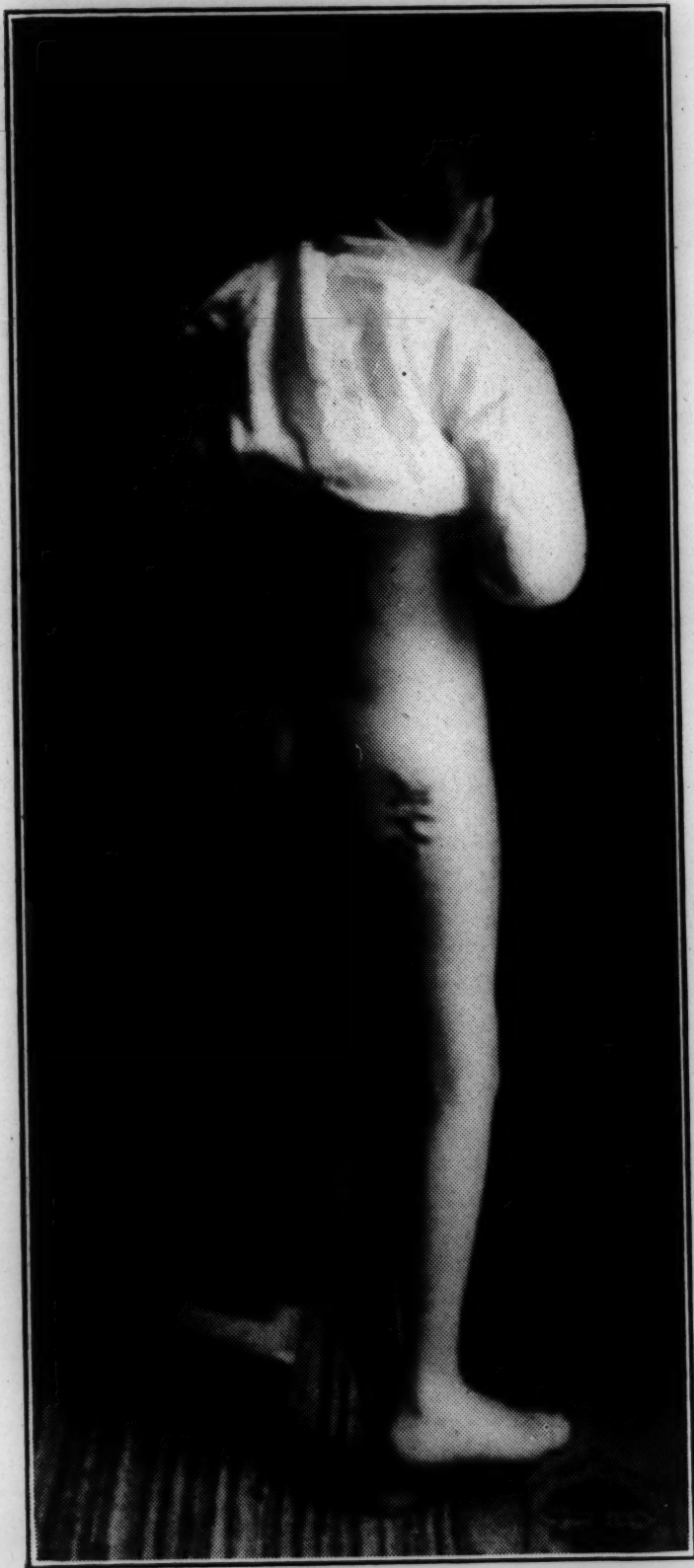


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5. The percentage of imperfect results, such as redislocation, ankylosis, shortening, and a pendant mem-

ber, are no greater with the open than with the un-open operation.

6. The prone position should be maintained for not less than one hundred days, at the expiration of which time the erect position should be assumed with crutches and an elevated shoe upon the opposite foot.

7. Anteroposterior motion of the artificial joint should be begun at the expiration of one hundred and twenty-five days.

8. The body weight should not rest upon the affected limb until after the one hundred and fiftieth day.

9. The use of extension braces is seldom if ever indicated with a unilateral artificial joint with or without the absence of the head.

10. They may, however, be used advantageously in bilateral artificial joints with or without the absence of the heads.

11. Muscular function of the leg should be restored as soon as possible by use and massage.

A DECEPTIVE FORM OF APPENDICITIS IN WOMEN

HARRY S. CROSSEN, M. D.

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There is an unusual form of appendicitis that proves very deceptive when occurring in women, for the reason that, in its clinical characteristics, it so closely resembles adnexal disease. The mass is situated in the tubo-ovarian region, and, furthermore, the mass develops so gradually and with so little acute disturbance that it is suggestive of a new growth rather than inflammation. These deceptive features are fully accounted for by the pathological changes found at operation. The exact pathological condition is not clear, however, when first exposed, for the mass seems to be *within* the cecum involving its wall. The cecum with the contained mass is movable and may be picked up and palpated between the examining fingers, and gives the impression of a new growth or other intracecal mass extending from the ileocecal valve to the lowest part of the cecum. The appendix is nowhere visible.

Within the last thirteen months I have had two cases of this character, and both came under my care with a diagnosis of tumor (new growth), presumably adnexal. In each case the mass, when exposed and directly palpated, was suggestive of a serious lesion of the cecum and ileocecal junction, possibly requiring extirpation of the cecum. The two cases were practically identical in their peculiar features, and they are

good examples of a distinct class that is very interesting when considered from the standpoint of diagnosis or from the standpoint of treatment.

CASE 1. Mrs. S., aged 39; seen in December, 1908, in consultation with Dr. D. E. Schmalhorst and Dr. Hudson Talbot, of St. Louis. The patient was a widow, the mother of three children, the oldest eleven and the youngest seven years of age. There was no particular trouble during confinements. Her general health was previously good, with the exception of some pelvic dragging and weakness since the birth of the children and a tendency to indigestion. In the spring and summer of 1908 the patient noticed a gradually increasing disturbance of her health. There were no acute symptoms, but she could not stand exertion as formerly and would have to rest in the afternoons. The pressure and indefinite distress in the pelvis and lower abdomen became more marked, though there were no distinct pains. In September, 1908, she noticed a lump in the right lower abdomen. It was not particularly painful, and she did not consult a physician, thinking that perhaps it was some disturbance that would pass away. This lump remained and increased in size slowly. There were no other special developments for a period of three months, at the end of which time she had her first acute, or rather subacute, attack. The day before Thanksgiving, 1908, the patient was shopping and walked a great deal. She felt unusually tired and weak, and there was some soreness through the pelvis and lower abdomen, but no sharp pain. However, after reaching home, she noticed severe pain in the region of the lump, and was obliged to go to bed. Within a few days she felt better and began to get about, but in a week from the first attack she had a second and more severe attack of pain in the same region. Dr. Schmalhorst was called, recognized a serious condition in the right ovarian

region, and called Dr. Talbot in consultation. The advisability of operation was apparent, and the patient was sent to the hospital, where I was asked to see her in consultation. On examination I found a mass in the right tubo-ovarian region the size of a small orange, flattened, firm, somewhat tender, and fairly movable. The patient was a thin subject who relaxed the walls well and permitted thorough bimanual examination of the pelvis. The appendix region was clear of trouble. The mass was exactly in the ovarian region, and there seemed no doubt but that it was ovarian or tubal in origin. This opinion, as to the mass being adnexal and not appendiceal, was held by Dr. Schmalhorst, Dr. Talbot, and myself. As to whether the mass was a new growth or inflammatory in character there was some difference of opinion, with no decisive evidence either way. The patient's temperature was normal; the pulse, 76, and respiration, 20; and she had had no fever at any time as far as could be determined. The mass was partially movable and did not present as much tenderness as was to be expected with an inflammatory mass of that size. All these facts pointed to the mass being a new growth, and that was the opinion held by Dr. Schmalhorst and Dr. Talbot, each of whom had given the case careful investigation.

The main features of the case certainly justified the diagnosis of a new growth of gradual development with the recent onset of subacute irritative symptoms. For myself, I could not reach a positive conclusion on that point, but from the somewhat irregular shape, partial fixation, moderate tenderness and absence of clear-cut borders, I was inclined to think it a chronic inflammatory mass. We all agreed that the mass was undoubtedly adnexal.

When I opened the abdomen, the right side of the pelvis was found occupied by the cecum, and in the cecum and about the ileocecal valve was the mass. The

cecum had been displaced downward until it occupied the ovarian region. The region of the appendix, about McBurney's point, was clear of trouble. Under the displaced cecum lay the right tube and ovary, practically normal. By breaking up a few adhesions I was able to raise the cecum so as to palpate the mass between the fingers behind and the thumb in front. It seemed to be situated in the wall of the cecum and occupied the inner half and extended from the lowest part to somewhat above the ileocecal junction (Fig. 1-A). The mass was firm and felt as though the cecal wall at the affected part were many times as thick as it should be. From the feeling of it as I held the cecum between my fingers, it might have been a carcinoma arising about the ileocecal valve or tuberculosis of the cecum or the chronic ulceration that occasionally produces much serious trouble in this region, requiring incision of the cecum. There were no obstructive features, and the ileum was normal. The appendix was nowhere to be seen, the guide-band of longitudinal fibers ending apparently in the cecal wall (Fig. 1-B).

As the mass seemed to be in the cecal wall, it was thought that possibly it would be necessary to excise the cecum. Having had experience, however, with the eccentricities of the appendix in certain cases, I determined to find the appendix before proceeding, both to have it for a landmark and especially to be absolutely certain that the trouble did not come from it. After considerable search I was able to make a line of cleavage at the end of the guide-band. Following this cleavage I came to the base of the appendix, and then following the line of cleavage further and separating the cecal wall, which had folded over the appendix and become adherent, I was able to expose the appendix throughout its whole length. The appendix and adjacent cecal wall were greatly thickened. This thickening of the cecal wall was apparently due

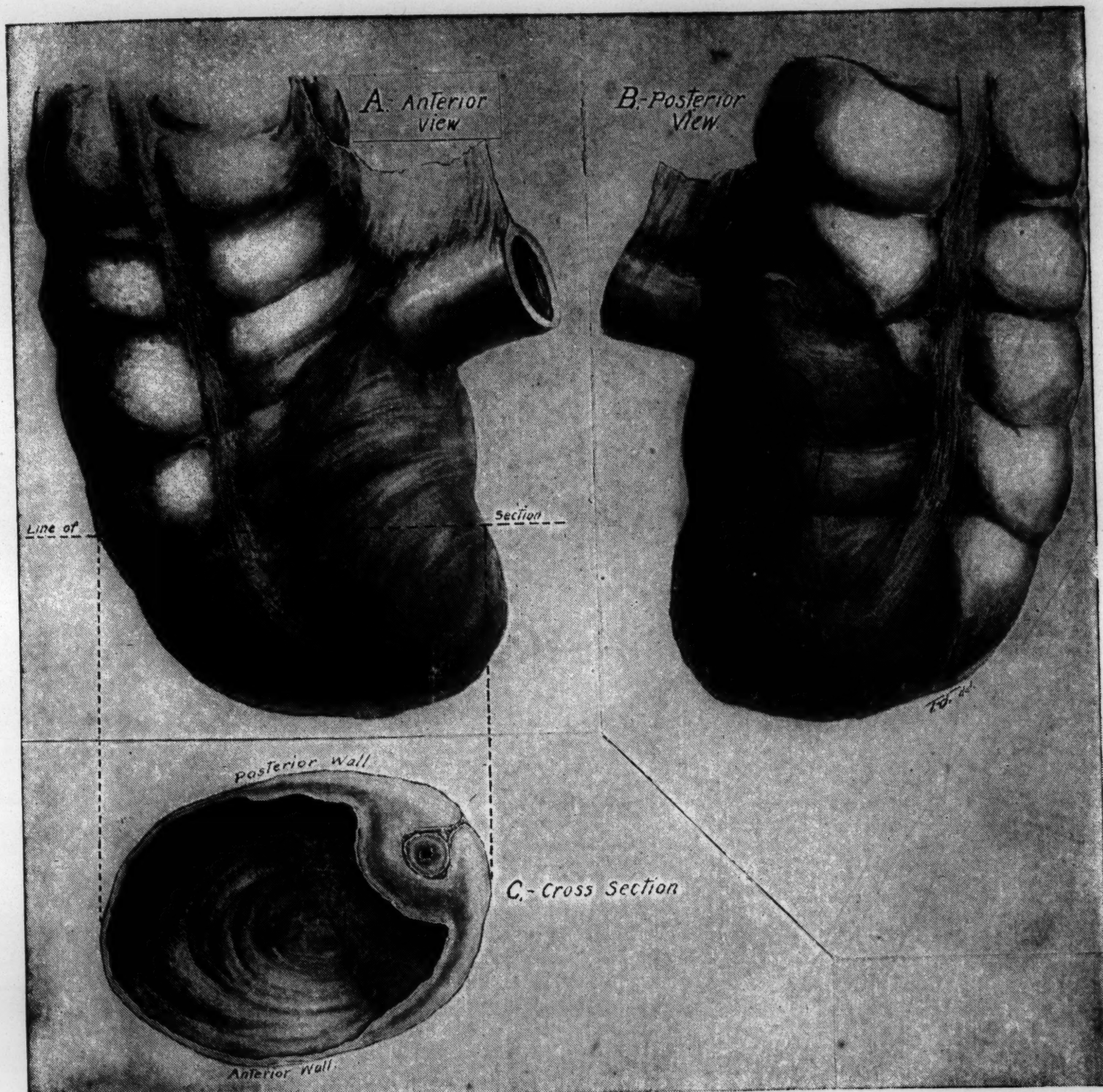


Fig 1

to chronic infiltration caused by the adjacent appendix inflammation. It was most marked immediately about the inflamed appendix and shaded gradually into the surrounding tissues (Fig. 1-C). The appendix was retrocecal, and its tip lay in the neighborhood of the ileocecal junction (Fig. 1-B). No pus was found, but in enucleating the thickened and friable appendix from its bed, it was torn, and a small enterolith escaped. After the appendix had been removed a large part of the mass still remained, being due to thickening in the cecal wall. I felt certain, however, that the thickening was not a primary disease of the wall, but merely inflammatory infiltration from the appendiceal inflammation. The infiltrated tissues were very friable, and it was with difficulty that I could get sutures to hold satisfactorily. The infiltration was extensive, and the inflammation chronic and of low grade. There was no evidence of its being tubercular. I brought a small drain out of a stab-wound in the side and closed the abdominal wound completely. Microscopic examination of the removed tissue showed no tuberculosis nor malignancy—simply chronic inflammation.

The patient convalesced without particular incident except that a considerable mass remained in the cecal region for a long time. Two examinations have been made since the patient left the hospital. The first, three months after the operation, showed a considerable mass still present in the cecal wall. The last examination was made a short time ago (about eleven months after the operation). The infiltration had almost disappeared. There is still a slight thickening below McBurney's point. It is movable and is apparently the remains of the infiltration in the cecal wall. The patient feels well, there is no special tenderness, and, save for the slight thickening, nothing remains of the previous trouble.

CASE 2. Mrs. H., aged 35, seen in May, 1909. The patient was the mother of three children, the oldest nine and the youngest three years of age. Her general health was previously good, and there was no particular local disturbance. In November, 1908, she began to feel badly. There were a dragging sensation and indefinite distress through the pelvis and lower abdomen and pain in the right thigh. The trouble increased gradually, but without acute symptoms until the latter part of April, 1909, when she became much worse. During the next two weeks she suffered almost constant pain in the right lower abdomen and pelvis, but kept up and at work. A physician was called in, and found a mass in the right ovarian region and made a diagnosis of tumor.

I saw the patient two weeks after the onset of distinct localizing symptoms. She was still trying to do her work, but was scarcely able to drag about the house. She complained of constant pain in the region of the mass. Examination showed very much the same features as those mentioned in the first case. In this second case, however, the process was apparently more severe. The general health was affected more, the pain in the mass was more constant and severe, there was more tenderness, there was some fever (temperature 101°), and the mass was larger, occupying the ovarian region and extending to the appendix region. The history was not distinctive of either tubal trouble or appendicitis. The facts ascertained by abdominal and pelvic examination were not positive either way, but from the situation of the mass I would have made a diagnosis of tubal inflammation had I not remembered the experience of the previous case. As it was, I put it down as probably tubal, possibly appendiceal.

When I opened the abdomen I found very much the same peculiarities as in the first case. The cecum was displaced downward and occupied the right ovarian re-

gion. There were adhesions limiting the mobility of the cecum, which accounted for the fact that in the examination the mass could not be displaced appreciably from the tubo-ovarian region. When the adhesions were separated, it was found that the mass was in the cecum and not in the tube or ovary. The mass involved the inner and posterior portion of the cecum and extended about the ileocecal junction. The appendix could nowhere be seen. After persistent endeavor, however, a line of cleavage was opened where I felt that the appendix ought to be. A little further progress into this cecal mass revealed the appendix, greatly thickened and surrounded by the inflamed cecal wall, which enveloped it. The thickened appendix was enucleated, and at its tip was found a small perforation abscess, containing not more than a teaspoonful of pus and well walled in. Drainage was established through a separate wound in the side, and the median incision was closed completely.

The patient had a stormy convalescence, the temperature going as high as 102.8° , in spite of free drainage. After a few days, however, the temperature gradually subsided, and eventually the patient made a good recovery. When she left the hospital there was still quite a mass, which I considered as due largely to the greatly thickened cecal wall. An examination recently (five months after the operation), showed that the infiltration had practically disappeared. No mass nor induration could be felt, there was no particular tenderness and no local symptoms. In this case, where pus was present, the infiltration disappeared much more rapidly than in the first case, in which no pus was found.

The special points to which I wish to call attention in connection with these cases, are as follows:

1. The *location* of the mass in the tubo-ovarian region, instead of in the appendix region. In the first

case palpation about McBurney's point showed no trouble there, and in the second case simply the edge of the mass extended to the appendix region.

2. The *scarcity* of inflammatory symptoms. Each patient was sick for several months, and quite a mass had formed before any acute symptoms appeared, and even when they did appear they were comparatively mild. So marked was this feature that the mass, in connection with the history, gave the impression of a new growth, and it was with that diagnosis that each patient came under my care. This is accounted for in a measure by the extreme chronicity of the inflammation and also by its inclusion in the cecal wall, as explained in the next paragraph.

3. The *apparent intracecal character* of the mass. This was a striking feature and was due to the folding of the cecal wall about the chronically inflamed appendix (Fig. 1-C). Because of the special relation of the appendix to the cecum, or because of the chronicity of the low-grade inflammation, or both, the infiltration and adhesions affected principally the wall of the cecum adjacent to the inflamed appendix. The hidden appendix was not hidden by adhesions binding the cecum to the posterior abdominal wall, for the cecum and mass were movable and could be lifted about freely after a few pelvic adhesions were broken. Neither was it hidden by being retroperitoneal. Microscopic examination of the removed appendix showed that it had its regular peritoneal covering, practically encircling it, hence it was not retroperitoneal. The appendix was hidden by being buried in the overlapped cecal wall. This is what made it so difficult to locate and expose the appendix, and it was this also which gave the sensation of a mass within the cecum.

This peculiarity is important from the standpoint of treatment, for, unless carefully investigated, such a condition might be treated by extirpation of the cecum,

under the mistaken supposition that the mass is a tumor of the cecum. This peculiarity helps to account also for the dislocation of the mass. As the cecum with its contained mass was movable, it naturally dropped downward into the tubo-ovarian region. Later, adhesions formed, fixing it in that abnormal location. Evidently the cecum in this type of cases is more than ordinarily movable, the unusual mobility being due to the high reflection of the peritoneum on the posterior wall of the cecum. Kelly states that this high reflection of the peritoneum is found in eight per cent of bodies, and he mentions that in such cases the cecum is apt to hang far down into the pelvis. This complete envelopment of the cecum by peritoneum also favors the extensive infolding of the wall as here found.

4. The *slow absorption* of the infiltration in the cecal wall, after the removal of the affected appendix. In the first case absorption of the infiltration in the wall of the cecum required nearly a year. In the second case, in which pus was found, the absorption of the infiltration was more quickly accomplished, requiring only about five months. Fortunately, in both women the abdominal wall was thin and permitted of deep palpation, consequently the diminution of the cecal induration could be accurately followed. Both patients recovered completely.

In designating this condition as a "deceptive form of appendicitis in women," I do not mean to imply that it does not occur in men, but only that it is especially deceptive when it occurs in women.

As to its relative frequency, I cannot speak with certainty. No doubt it has been encountered by several of the surgeons present, but the condition is practically unmentioned in the literature that has come to my notice, though I have not had the time for an exhaustive search.

I feel that attention should be directed to this class

of appendicitis cases because of the difficulties in differential diagnosis (principally in women) and also because of the difficulties in recognizing the true pathological condition after the abdomen is open. The apparent absence of the appendix may prove very confusing.

In discussing these two cases, Dr. Hurdon of Baltimore related to me the following instructive incident. In the museum of one of the large Eastern institutions was a mounted cecum labeled "Absence of the Appendix." Obtaining permission to dissect the specimen, Dr. Hurdon found just the condition here described; i. e., the appendix was buried in the overlapped and adherent cecal wall. So completely was it buried that it had been missed entirely by the physician who presented the specimen and by those who had since examined the same.

The fact that the apparent intracecal character of the mass may lead to a mistaken diagnosis of cecal tumor, is pointedly illustrated by the following case, which was related to me by Dr. A. Edward Meisenbach, of St. Louis, who witnessed the operation:

The patient, a man, was subjected to operation for trouble in the right lower abdomen. A mass was found which was supposed to be a malignant tumor of the cecum, and accordingly the cecum was removed. Following the resection the patient developed peritonitis and died. Subsequent examination of the removed mass revealed the fact that there was no malignant disease, but, instead, the condition described in the two cases here reported, i. e., an inflamed appendix buried in the overlapped cecal wall.

DISCUSSION

DR. ARTHUR E. HERTZLER (Kansas City, Mo.): I would like to tack on to this paper a few pathological observations. In Dr. Benjamin's specimens, which were exhibited yesterday, there was one good use shown, and that is in intestinal an-

astomosis you get a rolling up, a subperitoneal exudation, which, microchemically speaking, is a fibrin. Suppose you have here (illustrating on blackboard), instead of the appendix, the suture line. You find the peritoneum rising up to meet it, rolling over, so that the wedge between is not filled up from the outside, but pushed up from the inside. That is due to subperitoneal exudation, and it is perivascular; whereas, if you had the same exudation supraperitoneally, you would have adhesions. You get the condition here represented in cases of low-grade appendicitis. I examined the appendix of a case of this sort which was removed by a friend of mine as cancer. These are low grades of inflammation. You have a fibrinous perivascular exudate. That is an important thing. What interests me is, that in some cases I have traced this perivascular extension into the pelvis over the broad ligament as far as the uterus. In connection with this I have found the ovaries with the capsule thickened. Two weeks ago I resected an ovary of that kind in which there was an involuted appendix, the end-stage of the condition now under discussion, with the vascular changes over the broad ligament and the involutional changes in the ovary. I have done resection of the ovary with that association, with perivascular thickening, with disturbance in the involution of the follicles plus the appendix.

DR. B. B. DAVIS (Omaha, Neb.): No matter how much this point is elucidated, we shall always find cases of appendiceal trouble in women which give rise to difficulties in diagnosis. I know I have had the same trouble as others and although I have never in a woman met exactly with this condition, it will give rise to the same perplexity in the male.

I had a case ten or twelve years ago which was almost identical with the case given here except it occurred in a young man, about eighteen years of age. The trouble came on slowly. His symptoms lasted three or four weeks. It was a low grade of inflammation. We had no history of his condition at the time he entered the hospital. His temperature was almost normal. He had a mass in the right iliac region. It came on slowly and at that time I did not make any blood count. We had no guide along that line and my diagnosis was a new growth of some kind, probably a sarcoma, and inasmuch as he had great trouble from obstinate constipation I concluded we possibly had involvement of the lumen and I did an operation prepared to make a resection of the bowel as I thought in all probability that would be necessary. When

I first palpated the mass down in the cecum my idea was still the same and I was about getting ready to resect. On closer inspection there was a little edema apparent at one point and I began investigating a little further and worked into the mass a little way thinking I would see how it looked on cut surface and struck a little pus, just a few drops. In going further I discovered a fecal concretion in this case and finally took out the appendix, but so much trauma was inflicted that it was necessary to use drainage. The man made a good recovery. That case was almost exactly like the case that has been reported, and although it occurred in a male the difficulty in diagnosis seems to be equally as great as in the female except I supposed that the mass belonged to the cecum or colon rather than to other organs. When a woman has trouble with the right adnexa it is difficult to differentiate it from appendicitis, and that difficulty will always exist. I am very glad that Dr. Crossen has called our attention to these two cases because it will help us to avoid making errors.

DR. CROSSEN (closing the discussion): I feel that these cases really constitute a distinct class of appendicitis cases, with characteristics of their own, although they are not frequent. I found two in a short time. The points I wish to emphasize are these: first, clinically a patient with a mass in the right side in a woman in the tubo-ovarian region, even though not displaced, it may be a cecal mass. The second point I wish to emphasize is that when the abdomen is opened, this condition looks almost practically like a growth in the cecum itself and the point I wish to make further is that in all these cases where there is evidence of inflammation we ought to investigate that growth quite a little before we excise the cecum. I reported one case (and two others are reported) in which the cecum was excised for a tumor for just such a condition.

REPORT OF A CASE OF EXTRA-UTERINE
PREGNANCY, WITH TWINS, COMPLI-
CATED WITH OVARIAN FIBROID
ON THE OPPOSITE SIDE

DAVID WALKER BASHAM, M. D.

WICHITA, KANSAS

Much of our knowledge concerning twin ectopic pregnancy is due to the labors of Henig, Parry and Webster, each of whom has written very extensively on the subject. All of these writers have reported cases of twin tubal pregnancy.

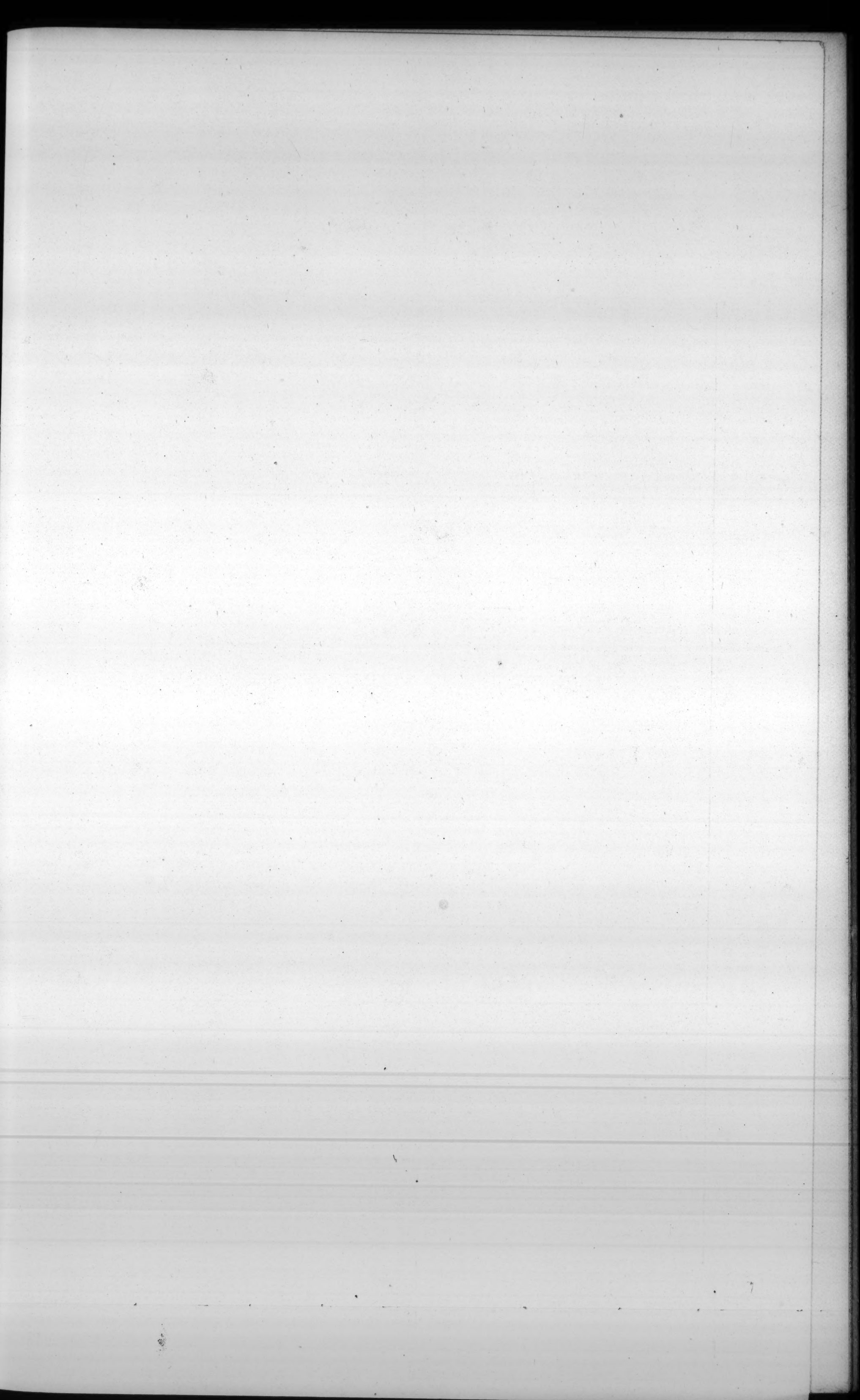
I think most of the cases of twin ectopic pregnancy reported have been of the compound variety, one fetus being extra-uterine and the other intra-uterine.

Jayle has collected twenty-eight cases of bilateral simultaneous extra-uterine pregnancies, which he has reported in extenso in the March and April number for 1904 of the *Revue de Gynecologie et de Chirurgie Abdominale*. I have been unable to find any comprehensive statistics on unilateral twin tubal pregnancy. Sanger and Krusen have both reported cases of triplets in tubal pregnancy, the fetuses all being of the same age.

Twins occur once in one hundred and twenty normal pregnancies. Extra-uterine pregnancy is met with once in twelve thousand normal pregnancies. How often unilateral twin extra-uterine fetation occurs is difficult to ascertain.

CASE.—On April 5, 1909, Mrs. O., aged 34, the wife of a commercial traveler, and the mother of a daughter, 12 years old, was seized with sudden, sharp pain in the lower abdomen. The pain was rapidly followed by pallor of the face, weak, thready pulse, and hemorrhage from the uterus. The situation became alarming, and Dr. Jordan, who was in attendance, summoned Dr. J. D. Clark. These gentlemen agreed upon the diagnosis of ruptured tubal pregnancy. The woman had missed a period, but had had a slight flow from time to time for several days, the flow having begun about two weeks after the missed period. It was necessary to administer restoratives, among which normal saline was used frequently. The next day the patient was removed to the hospital where I was asked to see her on April 7th. The abdomen was tense; there was a mass to be palpated in the cul-de-sac. The mass was of doughy consistence. There were rectal tenesmus and considerable pain in the abdomen. The pulse-rate was 110, and the temperature was 100°. There was still some flow from the uterus.

The operation took place on the morning of April 9th at the St. Francis Hospital. The abdomen was opened by the ordinary median incision. Upon incising the peritoneum there was a gush of fluid blood mixed with dark coaguli. The pelvic cavity was filled with dark-red clots of blood. The left tube was ruptured toward the outer end and still bleeding. The placenta was still within the tube. One of the fetuses was hanging in the rent in the tube, and the other was still in the sac or the remains thereof. Each had its umbilical cord intact and still attached to the placenta. The right ovary gave rise to a fibroma the size of a guinea-hen's egg and was of a dense consistence. The uterus was much hypertrophied and of a dark-red color. The pregnant tube was ablated. Hemostasis was effected by a clamp applied to the pedicle, over





which a running suture was placed, the clamp withdrawn, and the suture drawn tight and tied. The right ovary and accompanying fibroid were removed, and the abdomen was closed by three tiers of sutures.

The post-operative history of the case was quite satisfactory, save a slight infection of the plane of cat-gut sutures uniting the fascia in front of the recti, and a mild phlebitis of the left leg. The ultimate recovery was satisfactory.

Drs. Kelley and Anderson, internes of the hospital, very kindly examined the specimen, making slides of the fibroma of the right ovary, and making the photographs of the left tube, placenta, and the two fetuses, which I hope you may be able to see as they are passed around.

DISCUSSION

DR. R. C. COFFEY (Portland, Ore.): I wish to report another case of bilateral tubal pregnancy, which I believe is unique, so far as I know. Dr. McCalla, of Boise, Idaho, has looked up this subject and finds in the literature fifty-two cases of bilateral tubal pregnancy reported.

About five years ago Dr. Jessie McGavin, of Portland, called me to do an operation for ruptured tubal pregnancy. On opening the abdomen we found a ruptured tube; and hemorrhage continuing the tube was removed. Previous to this, I may state, the patient had made the absolute demand that she be not unsexed. She was determined to have a baby. She had just been married and wanted a child and would not consent to have the tubes destroyed. But this one we destroyed. On looking at the other tube we found another pregnancy in it, showing the enlarged vessels coming up to the growth. We supposed at first it was a tumor of some kind, but we found a large probe easily passed into the tube on up, and it was attached to one side, and that the tumor was another conception. We remembered her injunction and determined to try to save this tube, so we split the tube, removed the conception, scraped it with a curette, and sewed up the tube. I heard no more of the case for somewhat like three years, when the mother came in as a patient and the daughter, our former patient, came with her, and I noticed that she was

pregnant several months. She said: "You do not know me, do you?" I replied, "No." "Well," she said, "I am the patient you operated on for tubal pregnancy some years ago," and stated the fact that it was bilateral. I looked the case up and found she was correct. She not only had that child, but has had another since. This is rather unique in cases of tubal pregnancy. In that case I certainly would have removed the other tube if she had not given me the strict injunction not to do so.

DR. I. B. PERKINS (Denver, Col.): I have one case in which there was pregnancy in one tube and a large hematoma in the other. In the second tube, however, I was unable to demonstrate any product of conception. How that hematoma got there and what it meant I do not know.

I have had two cases in which pregnancy occurred in one tube and in the uterus at the same time. In one of these cases I was able to get the specimen with the product of conception hanging in the sac,—a little fetus hanging in the sac out of the opening of the tube,—and to show it in that condition. Within three days following an ovule was passed from the uterus in perfect condition showing the fetus in that sac just as perfect as the one from the tube. In the other case it was not quite so far along. I did not see the fetus from the uterus, but there was a placenta there, and the other one was removed from the abdomen about a week later.

One thing I would like to speak of in this discussion, although it is not quite in line with the discussion: It is a case of ovarian pregnancy which I operated on some two years ago and which was proven to be true ovarian pregnancy by Dr. T. S. Cullen, of Johns Hopkins University, who examined the specimen in his laboratory. I am looking up this subject at the present time and expect to report my case with all the cases I can find of true ovarian pregnancy, and I shall be glad if any of you will put me on the track of any cases that I am not able to find in the literature.

DR. R. J. CHRISTIE, JR. (Quincy, Ill.): I had not thought of taking part in this discussion, but inasmuch as Dr. Perkins referred to ovarian pregnancy it brings to my mind a specimen of that condition which I have in my office. I prepared and read a paper before our county society in which I reported a case of true ovarian pregnancy. Of course, the possibility of ovarian pregnancy was doubted at one time, and it was said it was a histological impossibility, but viewing

the case in the light of an ovary presenting some anomalous condition, it makes it possible, according to the opinion of pathologists, for these cases to occur.

In looking up the literature when I was studying the subject, not having in mind Dr. Perkins' case, I found my case was the nineteenth one reported at that time, which was a year ago. The condition is extremely rare, and the question was so warmly contested at one time that the great British gynecologist, Bland Sutton, made an attempt to disprove or verify the possibility of its existence. If I can find my specimen, I shall be delighted to have it analyzed properly and report the result to Dr. Perkins, so that he may put it in his report.

DR. ARNOLD SCHWYZER (St. Paul, Minn.): I wish to mention a case of extra-uterine pregnancy that occurred in the young wife of a brother practitioner. In this case we were obliged to leave a part of the tube, as we were asked by the doctor to do so. Several months later we were called unexpectedly during the night and found the patient with extreme pallor. On investigation we found we had again a ruptured extra-uterine pregnancy, and we made a diagnosis that it was on the same side. We opened the abdomen at once and found the extra-uterine pregnancy on the same side and in the stump we had left.

Since we are talking about rare cases, I will say that Dr. Howard A. Kelly, in his vast experience, seems not to have had a case of intermediary extra-uterine pregnancy. I will mention a case we had about six weeks ago, where we found in the edge of the uterine horn a rent, partly going into the tube and to the greater part into the uterus. This proved to be a case of intestinal extra-uterine pregnancy. The active bleeding was the severest I ever saw, while we were looking at it.

DR. BASHAM (closing the discussion): I have nothing further to add, except to refer to the management of the case reported by Dr. Coffey. I have often thought that we might be a little more conservative in our operations for extra-uterine pregnancy, as some of the English practitioners are becoming more and more conservative in regard to the management of cases of appendicitis, or of preserving the appendix; they simply open the appendix itself and drain it. I have felt that it was quite possible to preserve a tube that is not badly damaged in the operation for extra-uterine pregnancy, but I have never had the courage to put my con-

viction into execution, because, usually, some of these cases are *in extremis*. I have made up my mind, however, that if I find a case where I think the situation will justify it, I shall try the treatment Dr. Coffey used in his case, because I believe we may preserve tubes where they are not too badly damaged.

TUBERCULOSIS OF THE THYROID GLAND, WITH REPORT OF A CASE

ALBERT E. HALSTEAD, M. D.

CHICAGO, ILLINOIS

It is well known that the thyroid gland is rarely invaded by the tubercle bacillus. For many years it was considered the one organ of the body that was proof against this infection. Rokitansky¹³ made the positive assertion that it never occurred. Virchow, in his early writings, stated that some antagonistic relation existed between the thyroid gland and tuberculosis, and that the existence of a goiter was proof that the subject was not tubercular.

As further evidence of this antagonism, Rolleston points out that tuberculosis is common in myxedema when the secretion of the gland is wanting, and never occurs in Graves' disease where hypersecretion is known to exist.

As late as 1890 James Berry stated before the London Pathological Society that he was unable to find a specimen of tuberculous affection of the thyroid in any of the twelve large museums of London, nor in those of Oxford, Birmingham, Newcastle, Edinburgh, Glasgow, Geneveve, Berne, and Zürich. He exhibited, however, a specimen showing miliary tubercles, which had been removed from the body of a patient who died of general miliary tuberculosis.

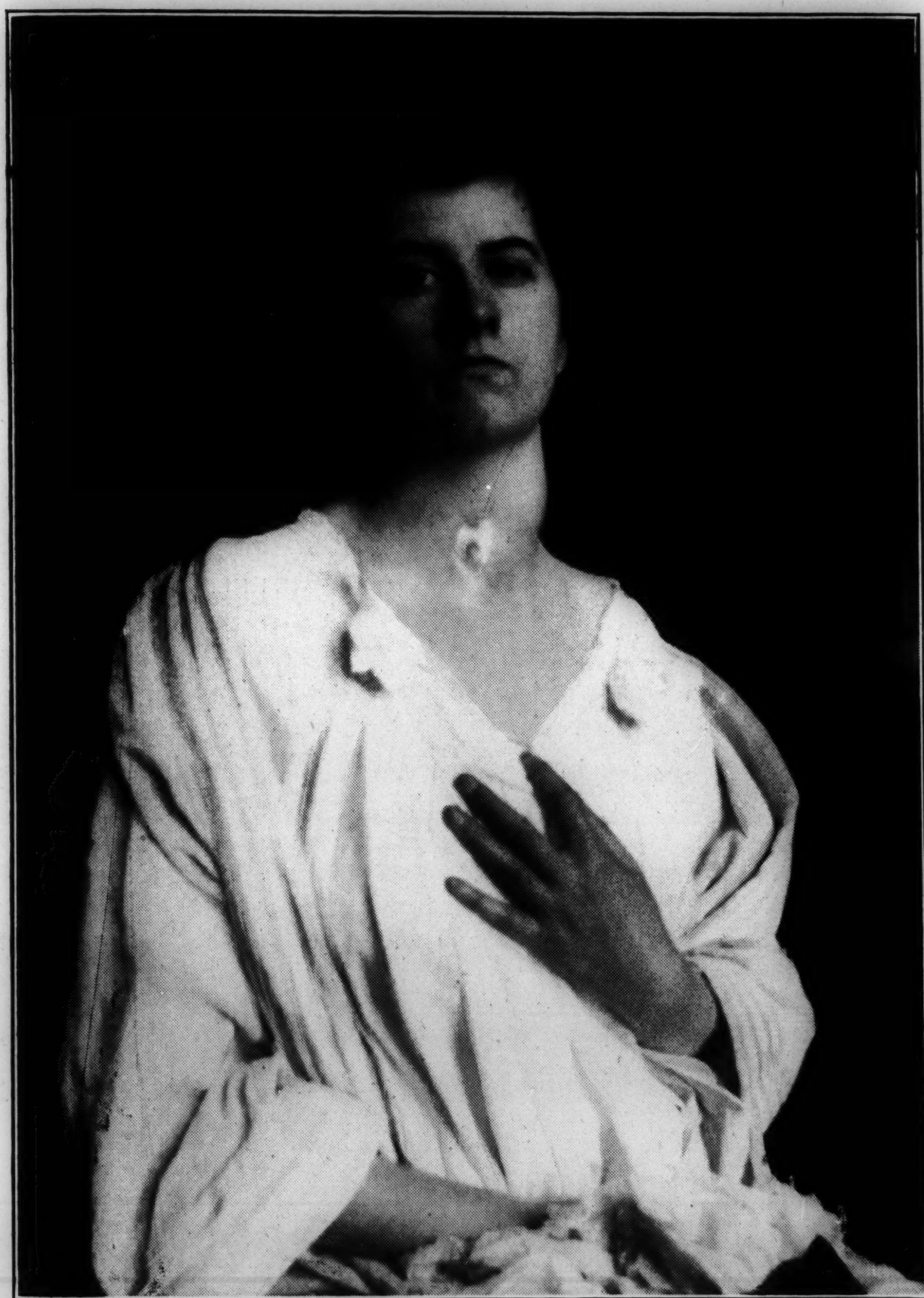
The first case recorded was that of Lebert, in 1862, in a woman of twenty-five, who died of acute miliary

tuberculosis. He found in the thyroid numerous miliary tubercles, otherwise the gland was not changed.

Soon after this observation was published, Cornil and Ranvier (1870) published a similar case, in which miliary tubercles were found in the thyroid in a case of general tubercle infection. Since then cases of this character have been reported by Conheim (Paris, 1870), Weigert (Virchow's Arch., 88), and Fränkel. The latter found, in addition to the miliary tubercles, caseating nodes, in a case of chronic pulmonary tuberculosis.

The first to record a case of what appears to have been a primary tuberculous infection of the thyroid was Weigert. In this case death from acute miliary tuberculosis resulted from a caseous focus in the thyroid discharging into a vein. At the autopsy a large tuberculous focus, containing liquified caseous material, was in intimate relation with the median thyroid vein, the lumen of which communicated with the cavity in the thyroid gland. No other old tubercular lesion was found, and no other explanation of the generalization of the disease was apparent.

Under the title of struma tuberculosa, Bruns (Beiträge zur Klin. Chir., Bd. X) describes what he regards as a case of primary tuberculosis of the thyroid, closely simulating malignant disease of the gland. F. E., aged 41, a widow, had had from childhood a small, soft goiter, which gradually increased in size, but caused no other trouble until six months before admission to hospital. During this latter period it had grown rapidly and caused much pain and dyspnea. The patient's general health appeared to be good and she had no cough or expectoration or any other sign or symptom of pulmonary tuberculosis. The thyroid gland was enlarged in all parts; the right lobe formed a swelling as large as a small fist and extended outwards under the sternomastoid and downwards under



Miss G. Showing thyroid fistula.

the clavicle. The tumor was covered by healthy, non-adherent skin. It had an uneven surface and was remarkably firm. The left lobe was soft and only slightly enlarged. In the neighborhood of the right lobe were a few enlarged glands. The larynx was somewhat pushed over to the left. There was slight paralysis of the right recurrent nerve, but the voice was scarcely at all affected. When at rest there was no stridor or dyspnea, but these symptoms were present on exertion. The recent rapid and painful growth, together with the remarkable firmness and irregularity of the tumor and the enlargement of lymphatic glands, led to the suspicion of malignancy. Extirpation of the right lobe of the tumor was performed without any difficulty on August 12, 1892, and the patient made a rapid recovery, leaving the hospital ten days after the operation.

The half of the thyroid that had been removed was of firm consistence and somewhat nodular surface. On section it was seen to consist chiefly of a homogeneous, grey, firm tissue, in which were embedded a number of isolated masses. These masses were of two kinds: numerous small circumscribed nodules up to the size of a bean, chiefly near the periphery, represented remains of thyroid tissue, partly unaltered, partly having undergone colloid degeneration, and several dry, yellow masses of the size of walnuts, which had the appearance of unsoftened, cheesy masses, like those observed in the so-called granules of large-celled tuberculous lymphomata. At the lower horn of the lobe was a collection of lymphatic glands of the size of cherries, loosely united by connective tissue.

The microscopical examination by Dr. Baumgarten showed tuberculous tissue, with the usual epithelioid and giant cells.

On November 2, 1892, the patient returned with an

enlarged lymphatic gland in the neighborhood of the scar. This gland was removed and showed "typically tuberculous" tissue. No tubercle bacilli were found either in the primary growth or in the gland.

Two other cases of primary tuberculosis of the thyroid are reported, one by Clairmont, in which a child of two years, otherwise healthy, suddenly developed a swelling in the neck, which in the course of two weeks reached the size of a small orange. As the tumor rapidly increased in volume, dyspnea, which was slight at first, became alarming. The child became restless and developed a cough. The tumor, situated just above the sternum, was soft and fluctuated, and apparently painful to touch. Aspiration yielded a grayish, thick, puriform fluid. The mass was then incised and curetted. This gave relief as far as the urgent symptoms of dyspnea were concerned, but the child did not gain in health, and a fistula discharging a thin pus remained. Two weeks later the open operation for the removal of the diseased tissue was attempted, but had to be abandoned because of hemorrhage. Six months afterwards, removal of the lateral half of the gland by v. Eiselsberge was successfully carried out. The wound, which had been packed with iodoform gauze, gradually closed by granulation. Microscopic examination of the tissue showed typical tubercular lesions. No evidence of other tuberculous disease existed.

The other case was reported by Lenormont (*Arch. Gen. de Chir.*, 1909). In the latter a cold abscess developed in one of the lobes of the thyroid, which was treated by drainage and curettage, and subsequently by partial thyroidectomy.

Although we find in the literature at the present time a number of cases of the nodular type of tuberculosis of the thyroid gland reported, most of them are secondary to some focus in a neighboring organ.

Grassert and Estor (cited by Lenormont) report a case where a large caseating focus developed in the thyroid secondary to a cervical Pott's disease. The infection reached the thyroid by way of the lymphatics.

Berard cites a case where a tuberculous abscess of the thyroid was consecutive to a laryngeal tuberculosis.

In Fränkel's case a large tubercular abscess developed secondary to a spinal tuberculosis. This abscess opened and discharged into the esophagus.

From a surgical standpoint, only the nodular or caseating type of tuberculosis is of importance; the miliary form is found only at autopsy. In this the former type the rapidity with which the tumor grows often suggests malignant disease, as in Bruns' case, while from the increase in size of the tumor grave compression symptoms early call for surgical interference. The nodular character of the tumor, the hard consistency, the adhesions of the gland to surrounding structures—all simulate, as do the rapid development of pressure-symptoms and the enlargement of the neighboring lymphatics (Bruns' and Fränkel's cases), the characteristics of malignant growths. With the development of tubercular abscess or the formation of fistulæ, the nature of the disease is made clear.

The following case came under the author's observation during the last year:

Miss G., aged 28, entered St. Luke's Hospital on May 24, 1909.

History: Present illness began about one year ago, when she first noticed a swelling in the neck to the left of the median line and midway between the chin and the sternum. At this time she consulted a physician, who told her she had a goiter and prescribed the local application of iodine. The treatment did not improve the condition and was soon abandoned. The

swelling gradually increased from the size of a walnut to that of a small orange. About a month ago it began to pain and to cause dyspnea and difficulty in swallowing. Poultices were applied, and after several days an opening formed, through which was discharged thick pus. Since then, at intervals of a few days, large quantities of pus and cheesy material have been discharged, without materially lessening the size of the tumor.

Examination on admission showed a well-nourished, healthy-appearing young woman. The temperature and pulse not above normal. Lungs, heart, and kidneys were normal. In the lower part of the neck, to the left of the median line, was a swelling as large as a small orange, which was firm and nodular to touch and not especially painful. The skin, excepting where the fistula presented, was normal in appearance. The tumor was not adherent to the surrounding structures and moved upwards and downwards with the act of deglutition. Upon introducing a probe into the fistulous opening, it could be made to enter about one and one-half inches, backwards and toward the median line of the neck. The fistula led to a small cavity that could not hold over a teaspoonful of fluid. The cavity was filled with bismuth and vaseline paste, which was forced in through a syringe. In this manner four ounces of paste was made to disappear. Just where it went to was a matter of doubt until an *x*-ray picture was made. This showed a cavity fully four and one-half inches in length and with a lumen that would about admit the index finger, passing down behind the sternum.

On June 1st the tumor was exposed through a transverse, curved incision. It was found to be the left lobe of the thyroid, enlarged by an inflammatory process. In the center of the mass was a cavity, the size of a filbert, lined with granulation tissue and con-

taining cheesy material and pus. The left lobe was separated from the surrounding structures and removed. The fistula was found to lead from the cavity in the mass and pass through the posterior part of the capsule of the gland and down behind the sternum for a distance, as measured on a probe, of five inches. After thoroughly swabbing out the cavity, it was packed with iodoform gauze, and the wound in the skin was closed by suture. The wound healed quickly, but the fistula remained after removing the gauze. This was treated for two weeks by repacking, after filling the cavity with iodoform emulsion of ten-per-cent strength. At the end of this time it had diminished in size until it would just admit an ordinary flexible uterine sound. The discharge had nearly ceased. It was then filled with bismuth paste. Upon her own request the patient was discharged, and she returned to her family physician for further care. From him it was subsequently learned that she had returned to her home before complete closure of the fistula was accomplished.

Examination of a cut section of the mass showed the remaining part of the gland was beset with small nodules, from the size of a pinhead to that of a pea. Some of these present in the center areas of cheesy degeneration. The large cavity in the center was partially filled with cheesy matter and presented upon its walls miliary tubercles of a grayish-yellow color.

Histologically, these corresponded to tubercular deposits. No tubercle bacilli were found.

REFERENCES

1. Berry: Tr. Path. Soc., London, Vol. 41, 261.
2. Berard: *Le Dentu et Delbet Trait de Chir.*, 1900.
3. Bruns: *Beiträge zur Klin. Chir.*, Bd. x.
4. Clairmont: *Wiener Klin. Woch.*, 1902, No. 48.
5. Chiari: *Med. Jahrbuch*, 1878, 69.
6. Fraenkel: *Virchow's Arch.*, Bd. 104—58.
Berliner Klin. Woch., 1897.

7. Lebert: Die Krankheiten der Schildiner, 1862, Bd. 2.
8. Lenormont: Arch. Gen. de Chir., March, 1909.
9. Perry: Tr. Path. Soc., London, Vol. 42, 298.
10. Rolleston: Tr. Path. Soc., London, Vol. 48, 197.
11. Roger et Garnier: Arch. Gen. de Med. T. 3, 1900.
12. Virchow: Die Krankhafte Geschwülste. Bd. 3.
13. Rokitansky: Lehrb. der Path. Anat., Bd. 3.
14. Schwarz: Cited by Berard.

THE SURGICAL TREATMENT OF GOITER

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Over-activity on the part of the thyroid, or inability on the part of the general system to utilize or eliminate the surplus, induces a condition to which many names have been given, the least objectionable and most expressive being *hyperthyroidism*. Although the symptoms were accurately described by Parry almost a century ago, and later elaborated by Graves, Basedow, Kocher, Horsley, Halstead, and a host of others, lack of knowledge of the definite pathological changes taking place in the gland preceding and accompanying the systemic manifestations, has produced a confusing and almost hopeless entanglement in the nosology and treatment of the condition, variously termed goiter, bronchocele, tracheocele, exophthalmic goiter, Basedow's disease, and Graves' disease.

Clinically, it has been known for years that we may have cases with great enlargement of the thyroid which produce little or no deleterious effects upon the general economy; conversely, tremor, tachycardia, exophthalmos, and skeletal muscular weakness have been observed in the absence of very marked thyroid enlargement. Explanation of these somewhat contradictory phenomena is found in the microscopic study of changes which have taken place or are taking place at the time the patient comes under observation. In the former, the large gland without symptoms, pathologic changes of a benign character are

found, including cytolysis, disintegration of acini, colloid, and cystic degeneration, which have destroyed large areas of glandular tissue, and, by increased intracapsular pressure from retained detritus, resulted in a species of lymph-block, which prevents the thyroid secretion, iodothyroglobulin, from entering the general circulation.

According to Wilson, there is an increase, not only in the number of intravesicular cells, but also in the number of vesicles, in thyroid glands which are over-active and producing symptoms. He further reports a very constant relation between laboratory findings and clinical symptoms. Germane to the foregoing are the deductions of Sajous, who, after an exhaustive review of the literature, presents the following conclusions:

1. What we term exophthalmic goiter is a syndrome, ascribable (*a*) to over-activity of the adrenals, due primarily to excessive thyroid secretion in the blood; then, in the second stage, (*b*) to insufficiency of the adrenals; *i. e.*, when the excessive thyroid secretion has induced their exhaustion or that of their centers.

2. All symptoms which have heretofore been directly or indirectly ascribed, in this disease, to the thyroid gland, should be attributed to excessive or insufficient activity of the adrenals.

The thyroid is developed from three separate rudiments, two lateral and a median, given off from the ventral wall of the pharynx opposite the second visceral arches. Remnants of the median diverticulum may be found in the adult in a cord-like ligament, extending from the thyroid isthmus to the foramen cecum on the dorsum of the tongue.

The parathyroids are composed of reddish-yellow epithelial cells contained within a distinct capsule, and have an independent circulation. (Evans.) They are

situated on the posterior surface of the thyroid capsule, and are about the size of a pea. They vary in number from five to eight, and are readily demonstrable. Although differing in embryologic origin and histologic conformation, they cannot be said to be disassociated functionally from the thyroid and certain other ductless glands, notably the adrenals, thymus, and pituitary bodies. Indeed, one physiological "fact," developed in the progress of physiology recently, which will perhaps survive the usual eighteen months' probation, declares as utter folly all attempts to assign one special function to each gland or organ; the lesser is contained in the greater, bearing in health a definite and complex inter-relationship to the whole economy.

Little is known of the function of the parathyroid bodies, but their complete removal is very constantly followed by muscular tetany and death. Beebe, by injecting a nucleoproteid, kept animals alive after removal of the parathyroids, and Russell found uniform changes in the cortical brain-cells of animals dead of tetany induced by the removal of the parathyroid bodies.

Many statements of a contradictory nature are found in the literature on the effects of total removal of the thyroid.

Gull, in 1874, described a condition clinically identical with myxedema, which followed removal of the entire gland. His observations were later confirmed by the Reverdins.

Kocher studied the changes following complete removal, and endorsed these clinical and laboratory findings, but gave it the name of *cachexia strumiprivia*. Other observers have denied the correctness of these deductions, and cite cases wherein total removal has been followed by no untoward effects.

It is highly probable that the latter observers were

studying cases in which accessory thyroid lobes existed, and, while the gland *within* the capsule had been removed, sufficient glandular secretion to regulate oxidation was being supplied by accessory lobes overlooked at the time of operation.

Maurice Faure records a case in which exophthalmic goiter and myxedema co-existed for a period of two years, and others, Baldwin, Gowan, L. Gautier, Joffroy, Achard, have observed cases in which myxedema followed exophthalmic goiter and erroneously concluded that excessive thyroid secretion does not result in the production of exophthalmic goiter, nor lack of secretion end in myxedema.

Recent biochemic and pathologic studies have conclusively shown that retrograde changes in the thyroid are of a benign nature in so far as the overproduction of iodothyron, thyroglobulin, etc., are concerned, and the above citations are but examples of over-correction through retrograde metamorphosis, leaving the patient in the same condition as if the thyroid had been removed, *i. e.*, devoid of secretion. A decided advance in the pathology and management of goiter was gained when we realized that simple goiter in the majority of instances will, if not checked by medicine or surgery, run the entire gamut of hyperthyroidism.

At present writing we may deduce the following rules for guidance in operating upon the thyroid gland: (a) Total removal is followed by myxedema; (b) removal of all the parathyroids is followed by tetany.

Carral, the wizard of vascular surgery, has obtained relief experimentally in induced hyperthyroidism by diminishing the caliber of the vessels supplying the thyroid, and has seen the effects of hypothyroidism disappear like magic after vasodilatation following nerve-section. He has also increased the blood-supply to the thyroid in reversing the current, by anastomos-

ing the common carotid with one of the thyroid veins, and providing for return of venous blood by suturing the superior thyroid arteries to the internal jugular.

Luska estimated the amount of blood carried to the thyroid as being equal in volume to that conveyed to the brain by one carotid and vertebral artery. Mayo, by preliminary ligation of both superior thyroids in acute goiter cases, preparatory to doing a two-stage operation, has obtained results which precluded the necessity for further operation upon the gland. We have had but little experience with this type of operation, but our results have been encouraging, in that the thyroid diminished in size, and there followed a marked abatement of symptoms, but no case was permanently cured.

We commend ligation of the superior thyroids in moderately enlarged hyperactive glands for the following reasons: Ligation is less serious than thyroidectomy, is never followed by hypothyroidism, and, if complete relief does not obtain, the patient will be in better condition for the heavier operation of removal of the gland at some future time.

American surgeons are coming to recognize more and more each year the inestimable value of preliminary preparation and post-operative treatment in all major operations. In no other class of surgical risks does careful preparation count for more than in the one under consideration. A week or ten days spent in bed with an ice-cap over the heart, two-gram doses of belladonna, and exclusion of visitors, combined with proper supervision of the personal habits of the patient, constitute our preliminary preparations. We sometimes give morphia and atropia hypodermically a few minutes before sending the patient to the ether-room. It checks some of the excessive bronchial secretions and allays nervousness.

Local anesthesia may act very well in a certain

phlegmatic type of patient, with whom the personality of the surgeon counts for more than the use of drugs. Personally, we prefer and employ general anesthesia in all goiter operations—ether given by the drop method.

The reverse Trendelenburg position will lessen the amount of hemorrhage, and a flat sand-bag beneath the shoulders will render the region of the thyroid accessible and facilitate celerity in operating.

After transverse division of the skin over the most prominent part of the enlarged gland, a flap should be reflected one-half inch or more, in order that the platysma may be divided on a different level to that of the skin. By separating the platysma and retracting the sternohyoid and sternothyroid muscles, the capsule of the gland, which in a degree resembles peritoneum, is exposed to view. The capsule may be divided on the anterior surface of the gland for the entire distance between the points where the superior and inferior thyroid arteries enter. Trabeculae extending from the glandular substance to the capsule usually give way readily on gently sweeping the finger between the gland and capsule. However, in some instances detachment of the capsule will be better accomplished by wrapping a piece of gauze around the finger, stretching the capsule, and gently breaking the connections by gauze dissection. Extreme gentleness in this manipulation will avoid laceration of surface veins, which may give rise to troublesome hemorrhage, delay operation, or prove fatal to the patient. The arrangement of the arterial supply of the thyroid is easily the most beautiful in the body. The superior vessels, branches of the external carotid, enter the capsule over the apex of either lobe. The inferior, from the thyroid axis, enters the lower pole of either lobe in close relation with the recurrent laryngeal nerve. There is a free anastomosis between

the four vessels and the thyroidea ima (latter not constantly present). Venous blood is returned through the superior and middle thyroid veins to the internal jugular, and by way of the inferior thyroid to the innominate vein. Nerves supplying the thyroid are derived from the middle and inferior cervical ganglia of the sympathetic. Pulsation of the superior thyroid may be felt at the upper pole of the gland, a hemostat placed upon it within the capsule, and another hemostat, which included some of the gland, is placed a short distance from the first, followed by division between the hemostats, will completely free the upper end of the gland.

If but one lobe is to be removed, division of the isthmus between two clamps permits delivery of the mass and exposure of the ascending vessel, which is caught in a hemostat and the entire lobe removed by one or two strokes of the scissors.

The vessels are ligated with chromicized catgut. The operation as described has been wholly within the capsule, and we are assured that the parathyroids and recurrent laryngeal nerve have escaped removal or injury.

Brouardel has happily styled the neck as one of the privileged regions of the body, and one should ever remember, in operating upon neck structures, that death from inhibition has followed slight traumatism, so slight, indeed, that no visible marks were present at autopsy.

In most of our cases we have been enabled, by longitudinal separation of the hyoid muscles and slightly flexing the patient's neck, to retract the muscles and deliver the mass without transverse division of the muscles. If division becomes necessary to deliver the gland or secure the vessels, division should be made well toward the hyoid attachment, in order to pre-

serve the nerve-supply, which enters the lower one-half or two-thirds of the muscles.

The ends of the severed muscles should be carefully coapted and ample provision made for drainage through an independent stab-wound. Some cases will drain freely for ten days or more. The capsule is closed by a continuous suture, the platysma is closed by interrupted sutures, and the skin margins are coapted and held together by skin clamps.

Saline, per rectum, preferably by the drop method, oxygen, ice-cap over the cardiac region, sufficient morphia for the first thirty-six hours to quiet the patient, constitute, in a general way, the post-operative treatment.

A portion of the gland should be left in doing a thyroidectomy. If, however, operation is followed by over-correction, and myxedema supervene, this may be relieved by transplantation of thyroid tissue or by giving the patient thyroid extract. The parathyroids have been successfully transplanted experimentally, but it is important to remember, in doing this work, that the herbivora do not have tetany after removal of these bodies.

FOR DISCUSSION SEE PAGE 320

INTRATHORACIC GOITER, WITH REPORT OF CASES

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Embryologists show that the several parts of the human thyroid gland unite at about the seventh week, the lower poles being formed from buds in the fourth branchial groove. The thymus gland originates in the third groove and descends to a lower situation. Through the changes incident to this transposition, it is possible that we have one of the causes for the malposition of a part of the thyroid to a situation within the chest, as an intrathoracic goiter, or the development of an accessory or aberrant thyroid in this position when it is completely separated from the main portion of the gland.

In the majority of instances the ordinary or simple tumors of the thyroid consist of two types: the colloid goiter, or diffuse adenoma, and the encapsulated adenoma, or fetal type, within the gland. The first form, when of an irregular and nodular character with large retention and colloid cysts, is often called follicular goiter; and the second form, cystic goiter or cystic adenoma. The greater number of intrathoracic goiters are one of these two varieties. If the tumors are of the colloid variety they extend into the chest as a prolongation of one of the lower poles, with something of a narrowing or constriction of the gland where it passes through the reduced space behind the upper portion

of the sternum. The depth of the extension within the chest, considering the growth in the nature of a true intrathoracic goiter, would probably be two or more inches below the upper sternal border. Such downward growths carry with them, as an outer covering, the loose fibrous capsule, while the true capsule of the thyroid becomes considerably thicker than normal and may become fused. The second and equally common form of substernal tumor is the encapsulated fetal adenoma, which varies in size from small tumors of an inch or more surrounded by more or less thyroid, to tumors the size of an orange, which have destroyed surrounding thyroid by pressure and are left with the thyroid capsule as a secondary covering with possibly a remnant of gland in a thin layer.

It is probable that not to exceed one-half of the intrathoracic goiters are diagnosed as a complication previous to their discovery during operation for goiter. Most patients having this form of goiter complain of pressure symptoms, described by them as being suffocative under exertion. In addition to actual tracheal compression there is usually some change in the voice, a metallic sound from some parietic condition of a vocal cord, due to pressure upon a recurrent laryngeal nerve. Mechanical or toxic irritability and irregularity of the heart are not unusual conditions. The size, appearance, and density of the thyroid in the neck in such cases are not sufficient as physical findings to account for the severity of the symptoms, and this should lead one to suspect intrathoracic goiter.

The appearance of the gland in the neck is usually that of a moderate-sized tumor, which seems to enlarge at its base or to disappear into the chest. From some radiographs which we have taken of the condition, it would appear probable that the *x*-ray may be made a useful adjunct in diagnosing the condition more frequently before operation. Tumors of the thy-

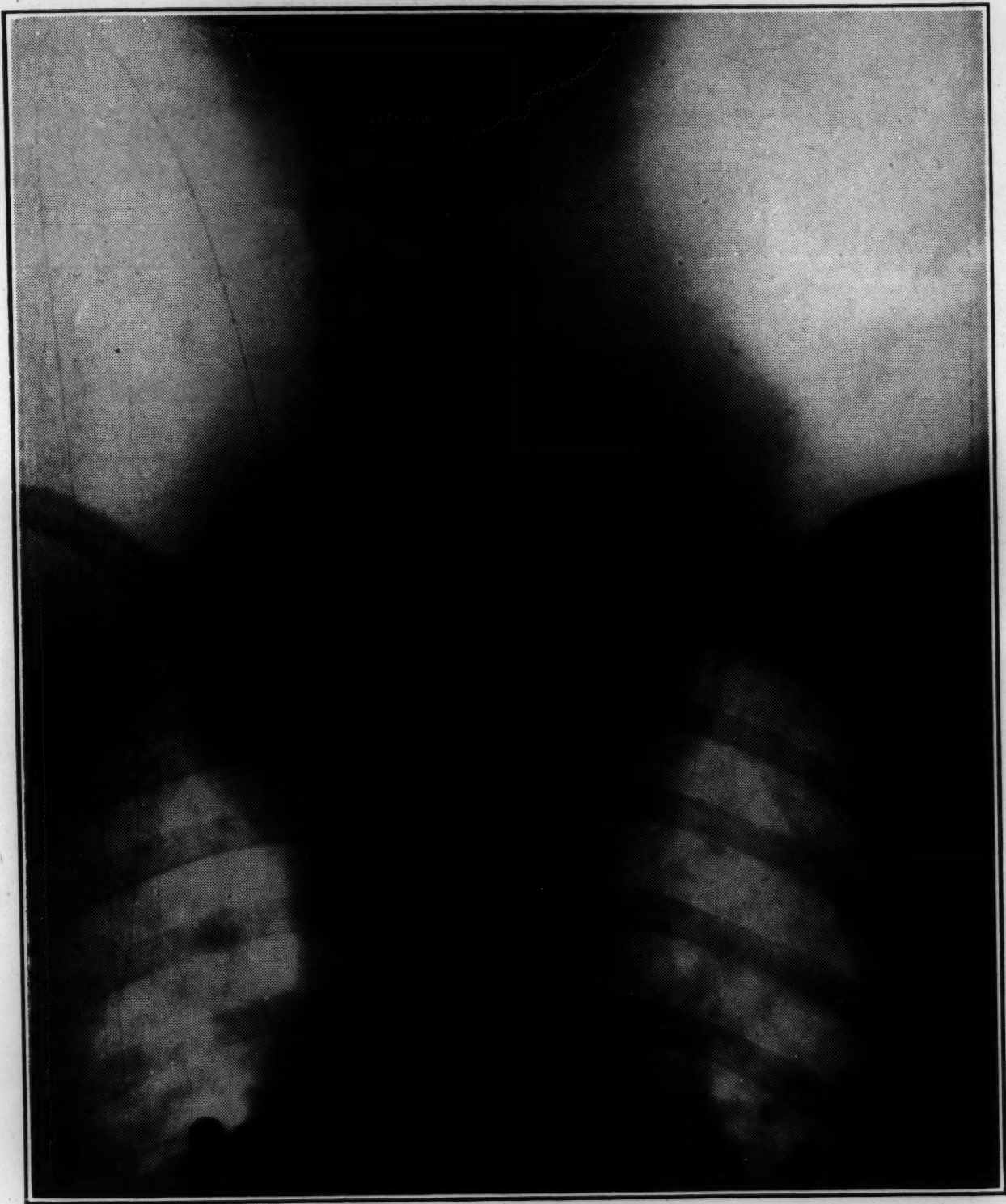


Fig. 1. Substernal adenoma of the thyroid.

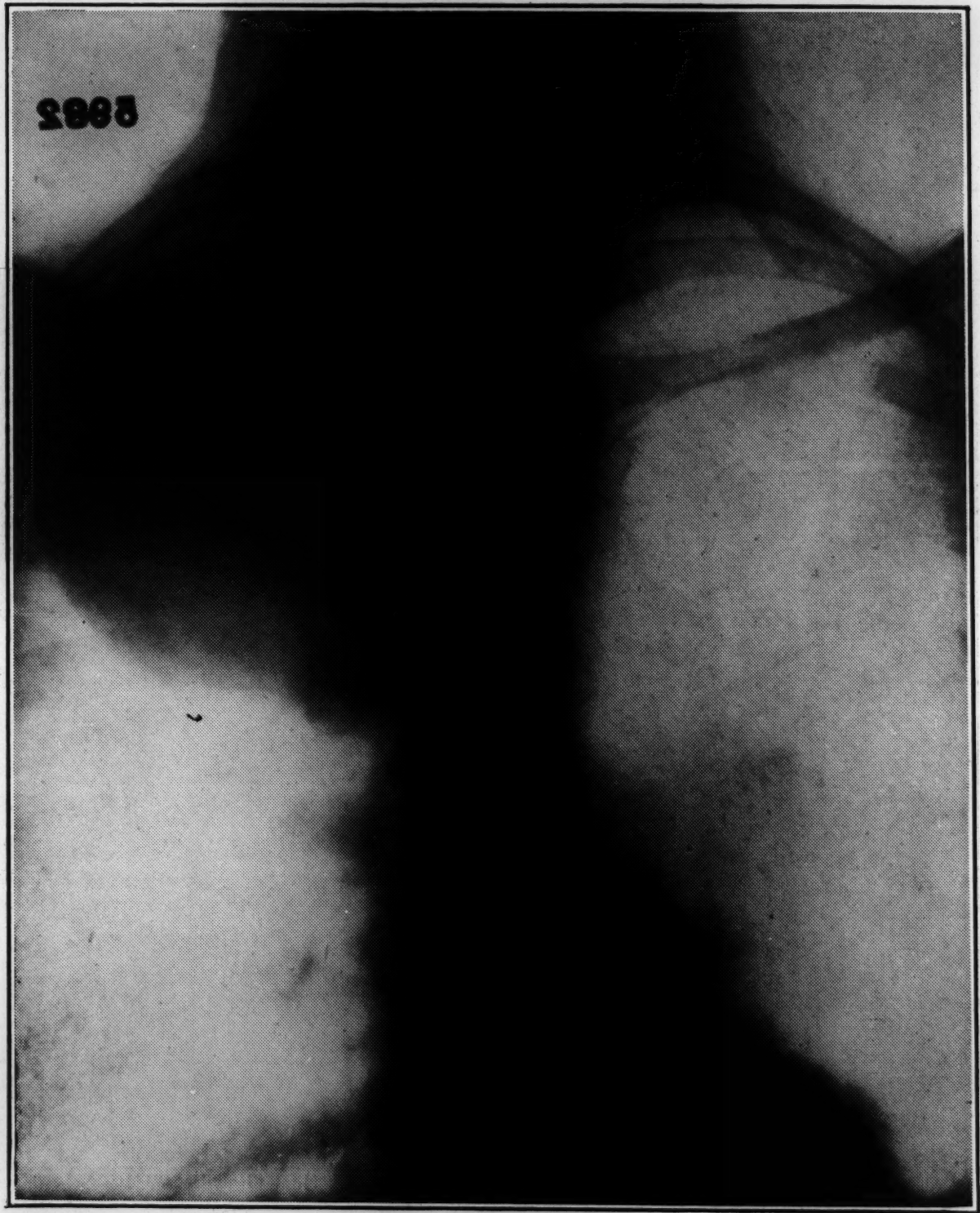


Fig. 2. Substernal adenoma of the thyroid.

mus, or thymus hypertrophy, must be differentiated.

Large goiters of a colloid type may also encroach upon the sternum and extend somewhat behind it, but they are not constricted or tongue-like in their projection into the chest, like the tumors under consideration, and should not be classed as such. Whatever variety the growth proved to be, we have always found the tumor connected with but one lobe of the thyroid, although it might extend to the other side of the trachea on its anterior or posterior surface within the chest.

Embarrassment of respiration may necessitate a local anesthetic. The anesthetic usually given is ether on the open mask, and it is preceded by morphia, 1-6 gr., and atropin, 1-120 gr., which allays nervousness and reduces the amount of ether required. These drugs also check bronchial irritation and tracheal mucus. In spite of this there is ordinarily an unusual amount of respirative difficulty, due to pressure upon the trachea, especially if there is venous pressure, which causes a vicious circle of trouble. If anything, it may be made worse upon exposure of the gland after a transverse incision with section of the muscles, since the gland in pushing forward constricts the trachea below.

At this stage the isthmus is quickly divided and clamped, the two halves of the thyroid being forced apart to expose the trachea. Extirpation of a lobe may be attempted, or the lobes are incised and shelled out, and clamped with many forceps, first on one side and then on the other, in an effort to free the trachea. Although the breathing may still be difficult, sufficient room is now obtained to explore beneath the sternum and examine the trachea when an extension of the thyroid is found, either as colloid masses or the exposed end of an encapsulated adenoma. As has been shown, there is a fairly heavy capsule covering these substernal

tumors, which will permit their finger-enucleation with comparative safety, although bloody. Respiration improves immediately that the tumor is removed.

In our experience great hemorrhage followed delivery of the goiter in but one case. This hemorrhage was venous, and was checked immediately by packing four large abdominal sponges within the chest, which were left in place four days then removed without trouble, and a lighter pack substituted. Secondary hemorrhages occurred fifteen and twenty-five days later, when the cavity was filled with Beck's hard paste of vaseline and bismuth, which was followed by healing in a few days.

In delivering the growth it is well to leave the base attached to the capsule, so that the capsule may be caught with many forceps as the tumor is elevated. Locking sutures of catgut may be employed to obliterate the pocket thus everted, intrathoracic pressure filling the space formerly occupied by the tumor. It has been shown that this eversion of the capsule is impossible in certain cases, and, as a part of such a space must be closed by granulations or by an organized blood-clot, drainage should not exceed twelve to twentyfour hours, for if the pocket drains for many days, it will probably discharge for many weeks until granulations obliterate the space.

If intrathoracic tumors of the encapsulated adenoma type are broken into and not removed, they are likely to discharge for an indefinite period.

Many substernal extensions of the thyroid have been removed during the operation for simple goiter, but of the type under discussion we have operated upon nine of the encapsulated adenoma, and nine of the extension of colloid goiter far down in the chest. The encapsulated adenoma type are usually the larger, weighing from fifty to two hundred grams. The relief following the operation of pressure is most marked,

and usually the voice is greatly improved where there is incomplete paralysis of the recurrent laryngeal nerve.

FOR DISCUSSION SEE PAGE 320

OUR PRESENT KNOWLEDGE OF THE PATH- OLOGY OF GOITER

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The present paper has to deal with what we know concerning the pathology of goiter, and is founded on the theory, which seems to be successfully defended, that the symptom-complex of goiter is due to structural changes in the thyroid gland and the unobstructed elimination of its secretion.

Since the thyroid is but a link in a chain of glands which exert a mysterious influence on the state of health that a perfectly normal body enjoys, naturally, the manifestation of its perverted function would be far-reaching and essentially confusing. This is the reason why earnest observers of equal ability and possessing the same degree of enthusiasm, which compels painstaking analyses and careful, truthful records, differ so widely in their opinions.

The clinical evidences of hyperthyroidism are those of a profound toxemia disturbing the functions of every physiological process at some time or other during its course. Nervous-system involvement is betrayed by irritability, depression, and even acute mania. Tinnitus exists and may result in a complete deafness which promptly recovers as the disease subsides or is cured. There may be disturbance of a special sense, of vision, taste, smell, headache, motor paralysis, insomnia, and palpitation of the heart. The circulatory system suffers local and general vasomotor paralysis, resulting in edema, to a greater or lesser

degree, and a heart that is racing to fill and keep filled an enormously dilated and relaxed vascular system, which results in tremor and greatly increased body-heat.

The patient suffering from hyperthyroidism, presents the same picture as an athlete after severe physical exercise, except the transitory dilatation of the right heart occasioned by the enormous return of blood forced into the circulation by the exertion.

We know that the normal thyroid has certain relations existing between the parathyroids, the thymus, the pituitary bodies, and the adrenals; and suspicious relations are possible with the carotid body, Lushka's coccygeal gland, the pancreas, and the sexual glands. (Park.)

Of the functions of the normal thyroid we know that—

1. It is intimately concerned in the (gaseous) respiratory interchange between tissues and the blood circulating through them.

2. The perversion of function, either by disease or experiment, must be regarded as due to malassimilation of oxygen by the tissue.

3. This perversion, in turn, is followed by lowering of the temperature, loss of fat, mental depression, and evidences of nerve exhaustion coincident with much weakness, muscular twitchings and maybe convulsions.

4. Some connection exists between thyroidal activity and phosphorus metabolism.

5. The thyroid is the great regulator of metabolism and consequently of nutrition. When in childhood it is inactive, cretinism results. Its activity is increased during pregnancy and lactation.

6. Thyroid secretion raises blood-pressure and quickens the pulse.

We know of two distinct forms of tissue in the func-

tion of the thyroid and parathyroid gland, and that these tissues are not wholly independent of each other, since the removal of one causes changes in the other, and it is generally believed, now that the myxedema which follows removal of the thyroid, together with the tremors and nervous symptoms, including tachycardia resulting from removal of parathyroid, that failure of the parathyroid is followed by enlargement of the thyroid. (Park, Medical Record, 1906, Vol. 12, p. 593.)

Von Mikulicz believed that the thyroid gland hypertrophies as a result of the same influences governing changes in other organs, and that the symptoms of thyroidism are therefore due to the changes in the thyroid gland but that these changes are secondary. In other words, he states that the thyroid acts as a multiplier, and that these influences producing changes in the gland may be due to other toxic agents than metabolic.

Broceur describes a case of acute suppurative thyroiditis due to staphylococcic infection, which, shortly afterwards, developed the typical symptoms of exophthalmic goiter. Death resulted in six months with severe psychic symptoms. Post-mortem examination showed remains of an abscess, in the thyroid gland, and a diffuse hyperplasia. The parenchymatous tissue in general showed degenerative changes similar to those seen in toxic conditions. (Von Mächädo, Berlin Klin. Woch., 1900.)

The goiter is at first the result of a turgescence of the thyroid vessels, later it is hyperplasia of the gland that leads to hypertrophy. All this is determined at the beginning by excitation of the sympathetic fibres, or by their ganglion in the bulb (Abadie). Hyperemic turgescence is nearly always combined with hyperplasia. The exophthalmia is attributed by certain pathologists to the active vasodilation of the retrobul-

bar vessels, which causes the eyeballs to protrude. Other authors explain the exophthalmia by the contraction of the musculature enervated by the sympathetic. According to Francois Frank the muscle of Muller, innervated by the cervical sympathetic, is responsible for the protruding eyeballs.

The hypotheses with regard to the function of the thyroid glands are as follows:

1. The thyroid gland destroys or transforms toxic substances produced during metabolism, and the facts in favor of this hypothesis are, that the urine, blood-serum, etc., of dogs that have their thyroid glands removed, are toxic (Gley), and that injections of thyroid extract in thyroidectomized animals improve conditions that are the result of the extirpation of the gland (Vassale).

2. This gland produces one, or several substances useful and necessary for the nervous system, the nutritive processes, and life.

It is possible that there exists a relation of dependence between these two functions in that the gland may utilize some harmful product, manufactured in the organism, by transforming it into a substance useful for the animal economy. According to some authors, lesions of the thyroid are constant in Graves' disease. When lesions are present they may be of two varieties: cystic formations or a sort of hypertrophic cirrhosis. These vesicular formations, which are disseminated in the intralobular connective tissue of the exophthalmic goiters, are liable to secrete a thyroid fluid, the quantity of which may be considerable without their epithelium having the character of the adult state. Professor Brissaud concluded that the thyroid gland is never in a healthy condition in the adult subject who dies from a chronic disease.

Based on anatomical physiological and pathological observations, the following theories have arisen:

1. When the thyroid secretion is quantitatively above the normal, the nervous centres are affected in such a manner that symptoms of Graves' disease are the result.

2. The thyroid gland secretes a quantity less than normal and not sufficient to neutralize the toxic products which accumulate in the blood, and, acting on the nervous system, determines the symptoms of Graves' disease.

3. The thyroid gland secretes an abnormal fluid whose toxic action on the nervous system, produces Graves' disease. According to Renaut of Lyons, an upholder of the latter theory, the thyroid gland secretes a thyromucoine, an embryonal substance different from the normal thyromucoine.

Wilson (Surgery, Gynecology & Obstetrics, June, 1909) states that it matters not in what form the increase of functioning parenchyma occurs, so long as there is an increase associated with unblocked lymphatics, the train of symptoms of hyperthyroidism is present, and that, later in the history of any case of exophthalmic goiter, when the parenchyma cells are decreased in function from overwork or insufficient blood-supply, or when the lymphatic drainage is obstructed or blocked from increased connective tissue. from endogenous irritants or medical or surgical interference, the toxemia subsides. He states, further, that a large percentage of cases of simple goiter show evidence of hyperthyroidism, and, conversely, that every case of exophthalmic goiter will become simple thyroidal hypertrophy if the patient lives long enough. MacCarty (American Journal of the Medical Science, June, 1909) believes that goiter is begun by some unknown irritative substance, and that the hypertrophy of the thyroid, with the phenomena following excessive secretion and absorption, is an attempted rever-

sion of the thyroid to its original function. He further classifies goiter thus:

1. The process of goiter may be a process of reversion of the thyroid gland to some former function.

2. Hyperthyroidism is a toxemia, the result of absorption of the products of the hyperactive thyroid.

3. The stimulus causing the hyperactivity may be the same that excited the thyroid to activity in primitive man.

4. This stimulus was then probably a normal stimulus to the gland, just as we have normal stimuli for glandular activity in man in his present condition.

5. This stimulus may still be present in the food or water, formed through some process in the intestine or in the metabolism of the body, or it may exist in the air.

6. The types of goiter are probably not types but stages in a general process.

7. Goiter may be classified upon a pathological basis as follows: (a) Cystic goiter (*thyroidea cystica*); (b) Hypertrophic parenchymatous goiter (*thyroidea parenchymatosa hypertrophica*); (c) Papillary cystic goiter (*thyroidea cystica papillaris*); (d) Hypertrophic fetal thyroid (*thyroidea fetalis hypertrophica*); (e) Fetal adenoma of the thyroid (*thyroidea fetalis adenomatosa*).

8. Hyperthyroidism always occurs in hypertrophic parenchymatous goiter and in papillary cystic goiter, and it may also occur in fetal adenoma of the thyroid.

The conclusions drawn by Marine and Lenhart are as follows:

1. Colloid glands are in all their anatomical characteristics the nearest approach to normal glands that active hyperplasias can become. This applies also in their iodine content.

2. Colloid glands are known to occur from spon-

taneous reversion of hyperplasias or following the administration of iodine-containing substances to animals with hyperplasia, and, in either case, the resulting condition (colloid) is histologically the same.

3. Partial removal of colloid glands is followed by the same compensatory hyperplasia as occurs in normal glands following their partial removal.

4. The administration of iodine-containing substances will prevent the occurrence of secondary hyperplasia in colloid glands to the same extent that it prevents the occurrence of hyperplasia in normal glands following partial removal.

We know that removal of the parathyroid body is followed by tetany, that this tetany follows removal in from twenty-four to forty-eight hours, and that there is an enormous elimination of the calcium salts, resulting in calcium starvation. (Quest, Oddo, and Sarles.) These cases are improved by the administration of calcium salts by mouth and venous injection. Silvestri (1906) states that the eclampsia and tetany can be explained by the diminution of the calcium in the organism. MacCallum and Voegtlin found in parathyroidectomized animals (1) a marked reduction in the calcium content on the tissues, especially the blood and brain; (2) an increased output of calcium in the urine and feces on the development of tetany; (3) an increased output of nitrogen in the urine; (4) an increased output of ammonia in the urine; and (5) an increased amount of ammonia in the blood.

When the thyroid is removed the parathyroid tissue approximated in appearance to ordinary thyroid structure, but without any hypertrophic or hyperplastic changes. (Vincent & Jolly.) The tetany is ascribed to two causes: (1) hypocalcification or calcium starvation (Silvestri, Netter, Quest, MacCallum); (2)

toxemia due to removal of parathyroids or to a poison generated by protein metabolism (Pfeiffer & Mayer, Berkly, and Beebe).

Beebe found that strontium will relieve the tetany as readily as calcium, which would prove that hypocalcification was not the whole cause.

Ott's experiments lead to the conclusion that (1) the removal of parathyroids alone causes tetany; (2) pituitary extract will cause a temporary cure; (3) between the parathyroids and the pituitary there is a co-operative action; (4) the infundibular lobe contains the active principle; (5) tetany is not due to the want of calcium, but to the presence of a poison in the blood.

D. von Haunseman (Berliner klin. Woch., 1905) pertinently asks: What is the relation of enlargement of the thyroid gland to stroma-thyroidea? In the majority of cases the thymus gland is not changed in Graves' disease. It is in the normal atrophic condition. In five cases four showed enlargement of the gland. The thyroid gland has influence upon the thymus gland. The lymph-channels arising from the thyroid gland enter a group of peritracheal lymphatic glands, which are situated on the lower margin of the thyroid gland, and lymphatic glands in the posterior mediastinum.

Now, it is a well-known fact that when lymphatic glands are stimulated into activity from the periphery, they not only enlarge, but they also proliferate. The author believes that enlargement of the thymus in many cases of Graves' disease is not accidental, but is caused by the increased activity of the thyroid.

E. Gierke reports two cases of Graves' disease in which the thymus gland was persistent and hypertrophied.

CASE 1.—Thymus weighed 53 oz., and measured 12x

6x2 cm. The gland had the same lobular structure as is found in children. Hassel's corpuscles were partly degenerated. Histologically, it did not differ from that of a child.

CASE 2.—The thymus weighed 97 gm., and measured 9x9x2.5 cm., and consisted of lobules differentiated in medulla and cortex, and separated by a little connective tissue. In the medullary portion rather large Hassal's bodies were imbedded. The shape of the cells was exactly that of the infantile thymus. The size of the thymus gland was enormous. The weight from two to four times that of a normally developed gland, so that it could not be designated as a simply persistent gland. A great part of the substance must have been newly formed. There was distinct hypertrophy. It could not be determined that there had been first a normal subvolution of the gland followed by hypertrophy of the remaining substance. If we accept it as a fact that the enlargement took place in the course of the disease, then Hassal's bodies must also have been formed anew, or, in other words, epithelial cells, capable of multiplying, must have existed.

In Case 1 the thyroid was but little enlarged and showed both colloid parts and papillary spots free of colloid.

In Case 2 the picture of a colloid stroma was more pronounced, leading to greater enlargement of both lobes and to compression of the trachea. The changes in the thyroid most characteristic of Graves' disease were not predominant.

According to Thorbecke the mortality of cases with persistent thymus is remarkable, i. e., death shortly after operation is very frequent.

Case 1 of Hausemann died shortly after the operation.

Case 2 died the evening after the operation.

What is the relation between this high mortality and hypertrophy of the thymus? Is it possible that an increased function of the thymus damages vital organs, like the brain or heart? Clinical observers pronounce the result of most of the fatal cases to be due to cardiac paralysis. (Münch. Med. Woch., 1909, vol. LIV, p. 773.)

Crafts (J. A. M. A., vol. L, No. 3, p. 193, 1908) quoting the work of Berkley, Hirschfield, and others, stated that only sympathetic nerve fibres articulate with the anterior pituitary body or structure. Through these filaments coming from the cervical ganglionic supply by way of the carotid plexus, thence directly through the cervicothoracic sympathetic chain, the splanchnics and the semilunar ganglia, the pituitary is connected with the adrenals for the transmission of nervous impulse and stimulation of their glandular activity.

Experiments by Schaffer, Osborne, and Howell with the pituitary extract show clear evidence of stimulation of the adrenal bodies, and both experimental ablation of the cervical sympathetic in animals and the fatal results in human subjects further prove that the pituitary is the center of energy of the adrenals.

Rapid emaciation and death also follow the destruction of the pituitary or the severing of the neural path between these organs. Further investigation has shown that the pituitary body depends on the thyroid in turn for its stimulation. So then where the thyroid is acting in excess, theoretically it overstimulates the pituitary body, which, in turn, transmits its added excitation to the adrenals with increased secretion of those organs poured into the blood. When there is lowered function in the thyroid the hypophysis lacks its normal stimulus, as in the case where it is inher-

ently weak or where there is lowered oxidation of the blood from any cause or active toxicosis of the blood. The product of the adrenals is a colloid material, a chromogen is formed, and entering the circulation by the stream going to the inferior vena cava, it reaches the heart, and its presence stimulating the heart muscles by a remarkably affinity for oxygen, absorbs this important gas from circulation in the lungs.

The blood elements are bathed in the oxygenated medium and hemaglobin is converted into oxyhemoglobin. This quality of the adrenal secretion makes it the great oxygenating element of the system; therefore, it sustains action of the heart, respiration, metabolism, and cell-nutrition.

Graves' disease is an overstimulation with altered function of the thyroid, increased impulse from the pituitary, through sympathetic innervation of adrenals, causing hyperoxidation by excessive production of the secretion in the blood, and this in turn producing failure of those bodies by exhaustion.

Intimately associated with the foregoing process, if indeed not entirely dependent upon the normal relations of this system of which so little is known, the parathyroids may be considered. The rôle which the pituitary bodies and adrenals must play in the condition of hyperthyroidism varies considerably, and is of importance here only in the degree of relationship existing.

Sajous states that the thyroid furnishes, among other products, a secretion which sustains functional activity of the anterior pituitary body, which, in turn, is directly connected with the adrenals. These three organs, then, are known to be independent and to control the heart's action, the respiration, and general oxidation.

So much, then, for the pathology of Graves' disease.

If the pathology is obscure and fragmentary it is but the just result of a misunderstood physiology, for a clearly defined knowledge of physiological function of a part must precede the complete study of its pathology. It seems clear, however, that we are dealing with an entire system of glands, independent, in a measure, from any other save the circulatory system, from which it receives nourishment and which performs a very important function in our bodily economy. We know that the pituitary bodies, the thyroid, parathyroid, thymus, and adrenals, probably comprise that system, but further than that our deductions are weakened by mere speculation.

DISCUSSION OF THE THREE PRECEDING PAPERS

DR. ARNOLD SCHWYZER (St. Paul, Minn.): As to the etiology of common goiter: We have had in Switzerland of late a very interesting experience. There is a little village in Switzerland that had been cursed with an enormous number of goiters, according to the population. In 1885, when all the school children were examined, it was shown that goiter was present in 59 per cent of all those examined. The chief surgeon of the Swiss army, Dr. Bircher, did a good thing in tracing the different goiter areas in Switzerland, and he found that it had much to do with geological formations. An intelligent minister, not a member of the medical profession, in that village, when he heard of that, communicated with Dr. Bircher. All the water supply for that village came from an area that was geologically morasses. Dr. Bircher advised that, instead of taking the water supply from these morasses, it would be better to go over on the other side of the river and take it from the chalky area (Zura chalk). The result was most striking. From year to year the percentage of goiter in school children was much less, and, to the glory of this sensible minister, in the year 1907, instead of 59 per cent, there was only two and a half per cent of goiter in that same village, which for years was known as one of the worst spots for endemic goiter. Moreover, of this two and a half per cent of cases it was shown that every one of them belonged to families that had immigrated from other parts of Switzerland and from Italy. The country developed very

much on account of factories, and there was an influx of population; and all these cases constituting the two and a half per cent were from families coming from outside, showing how much the water supply had to do with the disease.

I would like to say a few words with reference to Dr. Mayo's paper: Intrathoracic goiters have always interested the surgeon very much, because these patients develop what you call a goiter heart, a condition that is somewhat different from the exophthalmic goiter heart. You have no other exophthalmic symptoms, but just an effect upon the heart. Krause pointed out before the German Surgical Society that the goiter heart is a distinct clinical picture. Later on, after Kocher claimed that it was mostly thyrotoxic, Blanch differentiated it into the mechanical goiter heart and the toxic goiter heart, the toxic one being a split-off symptom of the picture of exophthalmic goiter. The mechanical goiter heart is to be demonstrated by a dilatation of the right auricle by percussion. Krause pointed out that it was not a constant dilatation, but the heart was shown to swing out wide and contract again under the *x*-ray screen. It is not so much a dilatation as it is a great distention during the atrial diastole. In the toxic heart, especially with hypertrophy of the left side, murmurs are heard over the whole heart. There is accentuation of the second pulmonic tone and also of the second aortic tone, but there is especially tachycardia.

During this year I had four intrathoracic goiters. I had some before, but I do not know how many in all. I have brought here some pictures which demonstrate points in regard to goiter heart which I want to bring out.

The first case is a mild one with two deep processes down behind the first ribs (demonstration of picture). A real intrathoracic goiter reaches below the upper border of the first rib, while those lying behind the clavicle are only *strumæ profundæ*. In this case the heart was not affected; there was, however, tracheal dyspnea.

The second and third case were son and mother of the same family. The boy, 18 years old, was brought to the hospital in extreme dyspnea, (as a child, sick with diphtheria). The lower sternum was drawn in at each inspiration. He had, besides, a medium-sized double visible goiter, a solid lobe in the chest the size of a fist, while his mother had even two such lobes, one descending on each side. We have here in both cases goiters which reach to the second rib, and in the boy's case even a little below the lower border of the

second rib. We had to make a tracheotomy in the boy at once. His mother had a double intrathoracic goiter, and here (pointing to picture) you can see the first rib from above and see how the goiter bulged out underneath it. Both of these cases had toxic hearts. The pulse went to 160, 180, and 190. In the young man the pulse decreased within about two months to normal, while in the old lady the pulse is still irregular and high, six months after the operation.

The fourth case was an intrathoracic lobe the size of a duck's egg in an exophthalmic goiter. This case has as yet not shown any benefit on the heart, the only one of all my exophthalmic goiters. The other symptoms have improved, she grew fleshier, feels better, and is less nervous.

DR. HAINES (closing the discussion on his part): It was my desire to bring before you the importance of the early recognition of hyperthyroidism and its correction in one way or other. I urged taking up the cases and relieving them before irreparable damage is done to the heart muscle. The internists are working in this direction and it is to be hoped something in the way of a serum will be developed that will relieve many of these cases and do away with surgical operation. I think Dr. Beebe hedged a little on his Atlantic City proposition at the recent meeting of the Mississippi Valley Medical Association, held in St. Louis, but he is working along the right line, and I hope he will give us something definite in the near future.

The technic I described is simple, and if carried out you will avoid doing damage to other important structures, such as the recurrent laryngeal and the parathyroids.

DR. MAYO (closing the discussion): It has been brought out by the papers that a continuous effort is being made to classify these cases as Grave's disease and Basedow's disease, following the report of a few cases from seventy-five to one hundred years ago, and to treat these conditions as if they were distinct entities, instead of a syndrome of symptoms which represent a true condition from start to finish. They did not think in those days that these cases vary in degree of severity, and that there are acute and chronic and all sorts of conditions of hyperthyroidism, with remittent symptoms, so that we cannot classify them into these few groups, with few symptoms, and the few cases of one hundred years ago were reported without any pathology to go with the conditions. To-day there is real change in the gland which any

pathologist, who is accustomed to examining these cases, can recognize in at least 80 per cent of the cases.

Dr. Schwyzer brought up the important point about the goiter heart. In over one-half of them it was the condition of goiter and its extension. When I found this intrathoracic condition I thought there was enough trouble in the neck to account for it, and from the start in operating on these patients I found they had considerable trouble with respiration. Most of the bad cases represented an intrathoracic condition, and there was one regular vicious circle of compression back of it, and by the loss of oxygen and the great difficulty in respiration, which some of these patients had, I had to make a tracheotomy in the more serious cases three times.

As to the mortality of ligation: Ligation leads us to take in cases for operation that are more serious than we used to take in for thyroidectomy, and ligation gives a higher mortality on that account than operation on the gland itself as a primary procedure.

SCOPOLAMINE AND MORPHINE AS A PRE-
LIMINARY TO GENERAL ANESTHESIA:
A REPORT BASED ON AN EXPERIENCE
OF ELEVEN HUNDRED CASES

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To one who studies the medical literature the large number of articles on anesthesia seems to indicate that the ideal anesthetic has not been discovered, that the ideal method of administration has not been invented. When anesthesia was first discovered the only demand made was that it relieve the patient of the knowledge of all pain during an operation. However, additional demands have been made from time to time until now the patient asks that he not only be relieved from the knowledge of pain, but that the anesthesia will be free from danger and discomfort to him. The surgeon insists that the anesthesia shall be free from danger and that the patient shall be quiet and passive, with the muscles relaxed, during the entire time of the operation.

Practically all the dangers can be avoided by an expert anesthetist, in the judicious choice of the anesthetic and a skillful method of administration. This is evidenced by the reports of a large number of anesthetics given without a fatality in different parts of the country (¹ and ²). Very much of the discomfort experienced by the patient while "going under" may

be avoided by expertness on the part of the anesthetist, and a first-class anesthetist will give a smooth uniform anesthesia that will keep the patient asleep and relaxed throughout the operation in response to the surgeon's requirements.

These demands upon the anesthetist are fast making the administration of anesthetics a special line of work, and the day seems not far distant when patients will insist that the anesthetist be trained and experienced in that particular part of the operative procedure.

However, with all the improvements in the choice of anesthetics and the method of their administration, there still remains with the patient a strong disinclination toward being put to sleep and passing through unknown dangers while utterly powerless to help himself in any way. This decided antipathy to being made unconscious amounts to a positive terror, sometimes, and has even been advanced as a cause of some of the sudden deaths reported under anesthesia.

It was a desire to overcome this unpleasant feature that led me to use the combination of scopolamine and morphine, as a preliminary to general anesthesia, on myself at one time when I changed places and became, for the time being, the patient instead of the surgeon. The action of the preliminary was so satisfactory that I adopted its use in my work and the following report, based upon one thousand one hundred and twenty cases in which it was used, is made so that the truth concerning this much-abused combination may be ascertained.

My attention was first called to the use of the combination of 1-100 grain of scopolamine and 1-6 grain of morphine as a preliminary to a general anesthetic by the article of Dr. M. G. Seelig in 1905³. Since then the combination has occupied a prominent place in the literature on anesthesia, and much has been written for and against its use. My experience seems

to prove that some of the things written are erroneous. Much of the misinformation has come from a failure to differentiate between the use of the combination as a general anesthetic, in which a large dose is given, and its use as a preliminary to some other general anesthetic in which the dose is comparatively small. The experience related in this article is based on its use as a preliminary.

As many things have been written that are contrary to our own experience a brief reference to some of them may not be out of place.

In 1905 Dr. Felix Terrier⁴, of Paris, wrote in relation to the scopolamine and morphine combination: "It should be noted that when we wish or are obliged to employ another anesthetic as well, we must never use ether, but always chloroform." In another place he says again: "We call attention once more to the fact that scopolamine should never be combined with ether, whose dangers it increases." In a large majority of our patients the scopolamine-morphine combination was given as a preliminary to ether anesthesia, and no harmful effects were noticed.

In December, 1908, Dr. J. C. Bloodgood⁵, in abstracting a German article on the scopolamine and morphine combination, says: "It is contraindicated in exophthalmic goiter." We use more of the combination in the exophthalmic goiter cases, because, in the effort to "steal the gland," as Crile recommends, we give a dose the night before, in addition to the dose given preliminary to the general anesthetic. We have seen no harmful results in the exophthalmic goiter cases. In the same abstract Dr. Bloodgood says: "It is difficult, however, in an active clinic to know in all cases when the hour before the operation will be." This is true, but it can be managed. We have frequently had a series of eight and ten cases on an oper-

ating morning, and each patient had the preliminary at approximately the proper time.

It has been urged that the scopolamine and morphine produce a contraction of the abdominal muscles, which makes the operating more difficult. We have not found this to be true. We have noticed, however, that it is difficult sometimes for the anesthetist to tell just when the patient is properly under the general anesthetic. The patient lies so quietly under the influence of the scopolamine and morphine that the anesthetist is apt to think that he is ready and properly relaxed when he is not. In those cases some contraction of the abdominal muscles will be noticed. A little more of the general anesthetic quickly remedies it.

In reply to the question of a correspondent, an editor of the Jour. of the A. M. A.⁶ says: "It [referring to scopolamine] is used for local anesthesia in connection with morphine." We have never seen any local anesthetic effects produced by the combination and have not heard of it being used in that way. Dr. H. C. Wood, Jr.,⁷ of Philadelphia, strongly condemns the use of the combination as a preliminary, although giving no personal experience on which to base his disapproval of its use.

The foregoing extracts are quoted to show what a large amount of misinformation has crept into the literature. On the other hand, since Dr. Seelig's report of sixty-five cases, in 1905, other reports are coming in telling of the beneficent effects of this combination when used as a preliminary to general anesthesia, and these reports are based on a large experience. Dr. C. M. Nicholson⁸ reported to this Association at its last meeting six hundred and fifty cases in which the combination had been used with no unfavorable results. He also reported the results of experiments on animals which seemed to contradict the conclusions

of Whitacre⁹, who claimed that the scopolamine-morphine combination produced fatty degeneration of the kidneys and liver when injected into animals.

It looks very much as if the prophecy made by Dr. James Taylor Gwathmey¹⁰ was coming true. He said: "But the administration of gr. 1-100 scopolamine and gr. 1-6 morphine one-half hour before the operation, and supplementing this by as much of any general pulmonary anesthetic as may be necessary, is theoretically correct and clinically safe. * * *

The combination of scopolamine and morphine or chloretone or cocain locally, plus a small amount of some pulmonary anesthetic, will undoubtedly be the anesthetic of the future." Our own experience corroborates fully the experience of Dr. Gwathmey as related in the article from which the above was quoted.

Technic of Administration.—Tablets are obtained containing a combination of scopolamine, 1-100 gr. and morphine 1-6 gr., and the solution is made just before it is administered, hypodermically, which is done one and one-half hours before the operation is begun. Relatives or friends are not allowed to see the patient after the hypodermic has been given. Sometimes an exception is made in the case of a husband or wife, but imperative instructions are given that the patient is not to be talked to and roused.

All necessary manipulations and handling of the patient in the preparation are completed before the hypodermic is administered. The room is darkened and everything kept quiet, and the patient falls into a tranquil slumber. About twenty minutes before the operation a layer of damp cotton is placed over the eyes, and he is taken to the operating-room and placed on the operating-table. The preliminary cleansing of the skin over the site of the operation is gently done while the general anesthetic is being administered.

The preparation and the anesthetization are usually completed about the same time, and the operation proceeds.

The preliminary hypodermic injection of the combination is given to all patients from eight years of age on up. If we consider an elderly patient strong enough to undergo an operation he is considered strong enough to have the beneficent effects of the combination, and it has not been withheld from any elderly patient on account of his age. Children are more apt to be nervous and apprehensive immediately prior to the operation than adults, therefore, we give the preliminary to all children who are eight years old and older.

There is a strong nervous factor in exophthalmic-goiter cases, and it has been claimed that nervous excitement increases the secretion of the gland, which is already overactive. For this reason we give the preliminary the night before the operation in these cases and again one and one-half hours before the operation.

We have not found any contraindication to the combination. If a patient's condition is sufficiently good to make an operation justifiable it is sufficiently good to permit the use of the preliminary. Very ill patients do better when very little general anesthetic is given them, and the preliminary of scopolamine and morphine permits the minimum amount of the general anesthetic to produce the desired amount of anesthesia.

When we first began to use the combination we used some chloroform as a general anesthetic, but we quit using chloroform after a time, and began using ether almost exclusively. In the majority of the cases embodied in this report the combination was used as a preliminary to ether as a general anesthetic. Lately, we have been using nitrous oxide gas to a consider-

able extent and we find that scopolamine and morphine act equally well as a preliminary to that general anesthetic. There is a great deal less of the convulsive movement of the muscles as the patient is going under the influence of gas when the preliminary is used.

We used the much-advertised hyoscine-morphine-cactin combination in about seventy cases, but could see no advantage in its use and went back to the scopolamine and morphine. We used the morphine and atropine combination in a few cases, but could see no reason for continuing its use when the scopolamine and morphine combination would do all that the morphine-atropine combination would do and give the added hypnotic influence of the scopolamine.

There have been no deaths that could be in any way attributed to the preliminary of scopolamine and morphine. There were no unpleasant symptoms except in one case. In 1907 among the early cases reported in this series one patient had some symptoms which seemed dangerous at the time. The patient was a female, aged twenty-three years, and the following is taken from the record of her case:

She was given the usual dose of scopolamine and morphine at 2:30 P. M., and the operation was started at 4:00 P. M. She came into the operating-room drowsy and in the usual condition after the preliminary of scopolamine and morphine. The appendix was removed, and the uterus suspended. The length of the operation was twenty-four minutes. She was put to bed, and normal salt solution was given per rectum with the foot of the bed elevated. At 5:45 P. M. the nurse went in and found her face blue, and she was breathing very slowly. It looked to the Sister in charge as if the respiration had almost stopped. The Sister pulled out the tongue with forceps, performed artificial respiration, and dilated the rectum. I

saw her at 6:15 P. M. Her face was then a reddish-blue, the pupils partially contracted and insensible to light, respirations eight per minute and a full pulse, 96, to the minute. I ordered an enema of hot coffee, which was given. In fifteen minutes she began to improve, and at 7:15 P. M. she was breathing naturally, her face was a normal color, and she was talking and complaining of feeling thirsty. The general condition and symptoms seemed to be that of morphine poisoning. It was surprising that the bad symptoms came on so late, more than three hours after the preliminary injection. Her further recovery was uneventful.

Either the patient had an idiosyncrasy for one of the drugs, or the tablets did not contain a uniform dosage and the tablet given her contained more than the usual dose. We are inclined to the latter explanation, because we have seen no bad effects since. For the past year the anesthetizers have noticed a more uniform effect of the combination on the patients, and we are inclined to attribute it to a better tablet with a correct dose.

About thirty minutes after receiving the hypodermic the patient becomes drowsy and is an eligible candidate for the "Don't Worry Club." All apprehension and fear regarding the operation are gone. He can be easily aroused, but should not be disturbed. He is partially asleep when taken to the operating-room and in a tranquil condition of mind. The transition from a partial sleep to complete anesthesia is not so sudden as from complete wakefulness to complete anesthesia, and is easily accomplished. A much less quantity of the general anesthetic is required to keep him completely anesthetized. After the operation he usually sleeps from three to five hours, and may partially awake and go to sleep again two or three times before becoming completely awake. The sleep after the operation saves him from the smarting pain of the recently incised skin and injured tissues.

There is very much less post-operative vomiting, about nine patients out of ten having practically none at all. The secretion of mucus in the throat is markedly checked, and in most of the cases is completely stopped. This prevents the danger of aspirating mucus into the respiratory passages and makes a quiet anesthesia.

The above experience based on eleven hundred cases seems to show that the use of scopolamine and morphine as a preliminary to general anesthesia is a rational procedure, adding greatly to the comfort of the patient by relieving him of all nervous apprehension prior to the administration of the general anesthetic, by permitting him to sleep some hours after the operation is completed, and by greatly decreasing the post-operative vomiting; and mitigating the dangers of the general anesthetic by lessening the amount necessary to produce the desired effect and by checking the secretion of mucus in the throat.

REFERENCES

1. Magaw, Alice, A Review of over Fourteen Thousand Surgical Anesthesias. *Surgery, Gynecology, and Obstetrics*, December, 1906.
2. Teter, Charles K., Thirteen Thousand Administrations of Nitrous Oxide with Oxygen as an Anesthetic. *The Jour. of the A. M. A.*, August 7, 1909.
3. Seelig, M. G., Scopolamine-Morphine as an Adjuvant in the Administration of General Anesthesia. *Annals of Surgery*, August, 1905.
4. Terrier, Felix, The Use of Scopolamine as a General Anesthetic in Surgery. *International Clinics*, 15th Series, Vol. II.
5. Bloodgood, J. C., Scopolamine-Morphine Narcosis. *Progressive Medicine*. December, 1908, p. 128.
6. Scopolamine-Morphine Anesthesia. *The Jour. of A. M. A.*, December 9, 1905, p. 1817.
7. Wood, H. C., Jr., Status of Scopolamine-Morphine Anesthesia. *The Jour. of the A. M. A.*, January 12, 1907, p. 159.
8. Nicholson, C. M., A Study of the Action of Scopolamine-Morphine on the Heart, Liver, and Kidneys. *The Jour. of the A. M. A.*, April 3, 1909.
9. Whitacre, H. J., Scopolamine-Morphine-Chloroform Anesthesia. *New York Medical Journal*, March 31, 1906.
10. Gwathmey, James Taylor, A Plea for the Scientific Administration of Anesthetics. *The Jour. of the A. M. A.*, October 27, 1906.

DISCUSSION

DR. MAJOR C. SEELIG (St. Louis, Mo.): This drug scopolamine has put me in a most anomalous position. I believe my paper was the first one printed in this country on scopolamine

as an adjuvant to anesthesia. I had seen it used at Landau's clinic in Berlin, and had used it myself in a series of sixty-five cases, and I have still a firm belief that it adds most marvelously to the efficacy of a volatile anesthetic, such as ether, which I always use with it. I do not use the drug any more, and that is where the anomaly comes in. The reason I stopped using it was on account of the numerous unfavorable reports that crept into the literature, most of which, I am constrained to say, were reports that were defective,—reports without autopsies, reports of anuria followed scopolamine after an operation on the kidney, a type of operation which we know is not uncommonly followed by anuria. It seemed to me that in face of numerous unfavorable reports I had better wait and be sure, or, at least, judicial in my attitude towards the drug rather than to attempt to force its use.

All that Dr. Collins has said with reference to his results I have seen verified myself, and it was merely a sense of personal hesitancy that caused me to drop the use of the drug. I happened to run across a paper written by Dr. Cushny, who is probably the leading pharmacological expert in this country or Europe. Cushny, after careful investigation—and why this has not been brought out more frequently in the literature I cannot understand,—tackled the problem as to whether scopolamine and hyoscine are the same drug. There can be no question but that an overdose of hyoscine is dangerous, and what may be all right for one individual may be considered an overdose for an individual with an idiosyncrasy to this drug. Cushny found that scopolamine and hyoscine are practically identical, chemically, but he found, further, that, although there is no chemical means of differentiating the various groups of scopolamine there do exist two groups, the only difference between the two being that one of these scopolamines will rotate a beam of light in the polariscope to the right. Another type of scopolamine will rotate a beam of light to the left. That is the only demonstrable difference, but the scopolamine that rotates a beam of light to the right is an innocuous drug. It is hypnotic. The one that rotates the beam of light to the left is also hypnotic, but possesses a marked cardiac and respiratory depressant action. I wrote Parke, Davis and Company in regard to this, and asked them if they would not investigate; and they never got beyond the stage of enthusiasm. The consequence is I do not know to-day when I am using scopolamine what

particular brand I am dealing with. The druggist or drug-house has to assure me whether the product is a cardiac and respiratory depressant or not, or whether they are giving me innocuous scopolamine which has merely the hypnotic properties. Consequently, I have been deterred from using it further until I hear more reports like the one Dr. Collins has presented to-day. If we get 20,000 cases with no bad results one will feel justified in using the drug.

DR. R. C. COFFEY (Portland, Or.): I tried the H. M. C. tablet on the dog, but when scopolamine and morphine first came out some of my professional friends took it up and found that the patients were so depressed that they were afraid, and I was afraid to use it. Some of my friends have continued to use the Abbott tablets, but we have been doing some experimental work during the past year on the pancreas, which is a shocking operation, producing so much shock that some in doing pancreatectomy advise that it be done in two stages, and even then the mortality is great. We found that the mortality was fully twice as great where we used the H. M. C. tablets as where we did not. We used morphine. We always use a grain of morphine in every dog. In these cases we used the H. M. C. tablet in addition, but Dr. Davis tells me that fifteen grains of morphine will not hurt a dog at all. It makes him comfortable, so that the question comes up whether the H. M. C. tablet combined with a grain of morphine is such a serious matter, or whether the H. M. C. tablet is a depressant. I would be afraid to use it extensively after the results observed in this series of dogs.

THE ABUSE OF HYPODERMIC STIMULATION DURING AND AFTER SURGICAL OPERATIONS

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The use of hypodermic stimulation during and after surgical operations is ordinarily governed more by the habit of the anesthetist or surgeon than by his deliberate judgment. It is unquestionably true that the anesthetists and surgeons who have had the largest experience and the best results use such stimulation rarely.

Many considerations enter into the solution of such a problem as this. The apparent necessity for stimulation will depend upon the skill and dexterity of both the surgeon and the anesthetist. It will also depend upon the anesthetic chosen, the environment in which the operation is performed, the previous condition of the patient, and the care with which he may have been prepared for the operation.

Given a patient in fair physical condition, prepared for operation with due care, skillfully anesthetized, and operated upon without undue loss of time or loss of blood, by a fairly skillful surgeon, and hypodermic stimulation will, with a few rare exceptions, be quite unnecessary. More than this: if unnecessary, it is definitely injurious. So far as the writer's observation and experience go, the great majority of the patients who are operated upon in our hospitals need

no hypodermic stimulation whatever during or after the operation, and, furthermore, they are injured if such stimulation is given to them.

The anesthetic, if given with judgment and skill, is for a time a stimulant of itself. This is particularly true of ether for the first thirty to fifty minutes, if, after this time has elapsed and the amount of anesthetic is diminished, as should usually be done, the depressing effect is not great, provided severe hemorrhage does not occur. If it does occur, hypodermic stimulation to increase the blood-pressure is, of course, definitely contra-indicated while it lasts.

After the patient is returned to his bed and as he recovers from the anesthetic, with the nausea, vomiting, and pallor incident to its administration, his pulse softens and, not uncommonly, becomes very thin and small, and even intermittent. It is under these circumstances that the inexperienced nurse and the unthinking doctor rush for the strychnia and spartein, and "shoot it into him." In reality, all that is needed is postural treatment, the external application of heat, and, possibly, water or salt solutions by the rectum or by the stomach, depending upon the nature of the operation that has been performed. His condition is no more serious than that of the small boy who has had his first large dose of alcohol or of tobacco.

More than once has the writer known of instances in which he has believed that the balance has been turned against a desperately ill patient by such a course of injudicious and irrational hypodermic stimulation. He has seen a patient die in the characteristic clonic convulsions of strychnia poisoning, and upon making a calculation of the amounts administered as recorded upon the chart it has been apparent that all conception of the enormous aggregate dose of the poison had been lost in the excitement of the effort to "pull the patient through." Upon

the other hand, he cannot recall a single instance in which he believes a patient has ultimately recovered as a result of the use of such hypodermic stimulation. In some instances temporary improvement may have occurred, but the subsequent reaction or collapse has been all the more profound, and those so treated who recover do so in spite of the treatment and not because of it. Better results could have been procured without it or by the employment of milder and more rational measures.

The best results and the lowest mortality of the busiest surgeons of to-day are attained by the simplest methods.

Careful diagnosis and accurate estimate of the ability of the patient to undergo the operation are made. He is prepared with great care; the anesthetic is wisely chosen and skilfully given; he is operated upon without avoidable exposure, delays, or hemorrhage; he is returned to a warm bed, placed in a favorable position, watched by a competent nurse, *and let alone*. If he is very restless and really suffering from shock or severe pain as he emerges from the anesthetic he may be given a moderate dose of morphine or atropine, but, notwithstanding its stimulating and soothing effect, he is ordinarily better off if it can be omitted.

No strychnia, no spartein, no digitalin, no nitroglycerine. No whip and spur for a tired and jaded and played-out or overworked heart, if such he has. No piling up of new poisons to impose additional burdens upon the organs of elimination. *Let him alone*. Keep him warm and *very quiet*. Give him all the water he can absorb by the avenue of choice,—mouth, rectum, under the skin, or within the peritoneal cavity,—and as few drugs as possible. His apparently feeble heart-action is often occasioned by the retention of a large volume of blood in the enormous veins of his thoracic

and abdominal organs, and as little blood is delivered to the right heart to be acted upon, little effort is required to pass it on to the left heart, and so on to the half-filled arteries against a greatly reduced arterial blood-pressure. The writer has long regarded this process as essentially conservative in its effect, and he has disapproved of what he has deemed unwise and irrational drugging in the treatment of such physiologic phenomena.¹

"By some means supply to the depleted vessels an increased volume of fluid at a high temperature for the heart and blood-vessels to contract upon, so that the circulation and blood-pressure may be speedily re-established. In abdominal operations this may be done by leaving a large volume of hot salt solution in the cavity; or * * * * * the abdomen may afterwards be opened and the fluid introduced, thus securing at once the application of heat to the great abdominal nerve-centers, the mechanical pressure and support of a large volume of fluid as an object upon which the abdominal walls may contract, thereby restoring to a degree the intra-abdominal pressure, as well as supplying water for absorption into the circulation. The sustained Trendelenburg position is, for obvious reasons, an important accessory."²

In the treatment of shock "Crile's therapy is founded on this hypothesis of vasomotor exhaustion. The drugs commonly used are not only inactive, but are positively harmful in most instances.

"Digitalis: The heart is not depressed or weakened in any way and a cardiac stimulant is not indicated.

"Nitroglycerin, alcohol: These drugs, by dilating the peripheral vessels, further lower the blood-pressure and hasten death.

"Strychnia: This drug apparently acts in customary doses only on the sensory neurons of the cord and thereby heightens reflex irritability. This action

is not stimulation. Under normal conditions strychnia may raise the pressure by facilitating the access of normal afferent impulses from the periphery. This action, in the presence of suitable factors, obviously conduces to shock. It is precisely antagonistic to the blocking action of cocaine, and, indeed, Crile found that of deeply shocked animals those receiving strychnia died more rapidly than the untreated controls, or, if they survived, convalescence was much more prolonged.

"Atropine, given before the experiments, was found to slightly lessen the tendency to shock."³

By such methods, based upon such reasoning and experimental proof, the greatest surgeons of the century are securing the best results and the lowest mortality-rate ever recorded in surgical literature. "The more they know the less they do."

If compelled to choose, be guilty of a sin of omission rather than a sin of commission. Give up acting for the sake of action in emergencies. Keeping a cool, calculating, thoughtful poise; order only those remedies and measures which reason and wisdom teach us may benefit and not injure the patient. Add nothing to his burden by doubtful dosing with deadly drugs.

Give him a chance.

Let him alone.

BIBLIOGRAPHY

1. The Conservative Agency of Shock. Wetherill. Western Medical Review, March, 1898.
2. The Effect of High Altitudes in Aggravating Surgical Shock. Wetherill. Annals of Surgery, April, 1897.
3. Surgical Shock: a Review of Recent Literature. By P. st Assistant Surgeon H. W. Smith, U. S. Navy. U. S. Naval Medical Bulletin, October, 1909.

DISCUSSION

DR. CHARLES H. MAYO (Rochester, Minn.): I have been much interested in this paper, and the doctor's lucid description of rational therapeutics always appeals to me. Most of our recent therapeutics come from Parke, Davis and Com-

pany, and with samples of drugs for our office-tables when we do not have anything else at hand or do not want to cerebrate. In the old days the hospital was graded according to the number of little tubes sticking through the wall, and on the other side were the various solutions for irrigation. Those were the days when we wore rubber boots, etc. There were a dozen or more things we could use. We were not restricted to one or two. During those days the anesthetizer was generally the youngest interne in the hospital, with the least knowledge, and he was trusted to anesthetize patients. He was sent off into a little room with two or three strong assistants, in case the patient struggled, and at the start their services were usually needed. The patient usually came in under protest and squirmed, but was soon subdued by asphyxiation. In these days there were different kinds of hypodermics, showing that they knew how to handle drugs, with brandy, strychnin, digitalis, ammonia, with all sorts of remedies to restore the patient. To-day the minute the anesthetizer has at hand three or four mouth-gags, hooks, and things to catch the tongue, with all sorts of agents to restore the patient back to life, you know that man does not understand the business of administering anesthetics. It is a shame to let such a man work at it. It is that kind of thing that has driven so many operators in this country to the use of local anesthesia for the reason that, first, because they had to devote time and half of their brain power to watching some one at the other end of the operating-table giving the anesthetic; and, second, because they could take more time and under local anesthesia could happily be free from the anesthetizer. To-day the anesthetizer is assuming an importance almost equal to that of the surgeon, in that he may select his own surgeon for the surgical work. (Laughter.) He drives up with a van and unloads, like a house-moving affair, with his apparatus for giving anesthetics and for restoring life, if necessary, and really he is doing good, but, to some extent, I think, it is being overdone. There is such a thing as having a regular anesthetizer to hospitals, and nearly all large hospitals now have trained individuals for such work and nearly all medical colleges are teaching the administration of anesthetics, a thing that has been neglected for many many years. We have had very little teaching in this line in the past; but I am sure we shall have much more of it in the future.

With reference to hypodermic medication: It is bad

enough for a well man to stand strong remedies, but it is hard on a sick man. When we need some remedy to go through a hypodermic needle, we always turn to something that is strong, something that is attended with more or less danger to life. When a patient is suffering great pain he needs some agent to afford relief, and he needs it mighty bad. To refer to different types of cases: The pregnant woman may need morphine, morphine before operation and morphine after operation for a number of days. A pregnant woman that has the necessary operation performed should have morphine given to her to keep the uterus at rest. Let us take cases of stomach trouble, surgical work in the abdomen, intestinal suturing, gastro-enterostomy, etc. These are rather painless procedures. It is not painful when you get through the parietal peritoneum. In our goiter cases, working on the neck, trimming along the trachea under ether, if you watch these patients, you can tell if they have had atropin before the operation or not. The atropin dries the mucus from the trachea. There is a rattling bronchitis in the effort to suck the bronchial mucus back and forth, and it is not good for these patients, because too many succumbed in the past to pneumonia. But if you give them a little atropin you will dry all that mucus.

DR. LEONARD FREEMAN (Denver, Col.): Dr. Wetherill asked me to read his paper with the idea of saying something about it, but I have very little to say except to commend his ideas strongly. In the last year or so I have gradually stopped giving stimulation during the time of operation and afterwards, unless strongly demanded in some way. Many of us, however, want to do everything possible, in case anything should go wrong with the patient, and that is the reason why we resort so often to unnecessary stimulation.

I think a paper of this kind, delivered before a body of this kind, is of the utmost use in helping to crystallize our ideas and to prevent us from doing things which are unnecessary.

DR. A. E. BENJAMIN (Minneapolis, Minn.): I think this paper is particularly appropriate at this time because it is a well-known fact that all over this country, especially among men of little experience, a great many hypodermics are given, before or after operation, with more harm than good. I think attention should be given to the anesthetist and the relation of that person to the patient. If the patient is an ignorant individual, who has been taught to believe that it is

a terrible thing to take an anesthetic and that it is a smothering process, it is necessary to hold that individual down and strap him to the table. The anesthetist should meet that patient, and tell him that the process by which ether is given at the present time is a simple one. I have found that if the anesthetist has an interview with the patient beforehand, he goes under the anesthetic more easily and submissively.

In regard to hypodermics: I think atropine is a great accessory in individuals of the type referred to by Dr. Mayo, particularly those who have chronic bronchitis. In cases where there is increased bronchial secretion, or if the patient is in the habit of perspiring too freely, or when a great deal of mucus is liable to form in the throat, I find atropine a great help. The patients take the anesthetic better, and they do not have the after-thirst. But in some individuals I have refrained from allowing them to drink much water beforehand. Where they drink much water and fill the system, they will do better if you cut it off a few days and get them used to it.

The after-treatment should be simple, with no hypodermics except in cases in which you want stimulation, then atropine is good and is more of a stimulant according to our modern idea of shock than any other drug.

DR. WETHERILL (closing the discussion): It was with a good deal of hesitation that I presented a subject so trite to this Association, because I anticipated the majority of the members would agree with the views presented, but I have presented it in this dogmatic, epigrammatic style for the very definite purpose which Dr. Freeman has indicated to you. Those of us who are doing work in general hospitals, where all the ambitious younger men are doing surgery, see a great deal of injudicious, unnecessary, and definitely harmful hypodermic stimulation. It will be worth a great deal to the younger members of the profession to have it go forth as the endorsed expression of this Association that such hypodermic stimulation is unnecessary, is injudicious, and that it may be definitely harmful; and it was for that purpose and that excuse which made the presentation of this paper at this time necessary or, at least, expedient.

FURTHER EXPERIMENTAL DATA ON THE VASOMOTOR RELATIONS OF SHOCK

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A correct theory of shock, however careful the experimentation it is based on, cannot be developed without considering in a priori fashion, certain accepted facts. Failure to handle the subject in this manner accounts, in large measure, for the wide diversity of opinion that prevails to-day, as well as for the marked degree of uncertainty and hesitancy that characterize our knowledge of this subject. Therefore, a theory to be satisfactory, even as a working basis, must dovetail properly with definitely known clinical phenomena, with recognized physiological laws, and with basic biological principles.

To just what degree a theory falls short, as the result of failure to deal with the problem from this point of view, we can best illustrate by a concrete example. It is safe to state that the most generally accepted doctrine of shock to-day, is the one first enunciated in the early sixties by Mitchell, Keen, and Morehouse, and cleverly elaborated during the past few years by Crile's experimentation. This doctrine states that shock is due to vasomotor exhaustion and consequent paralysis and dilation of the peripheral vascular system. The clinical phenomena that almost

constantly accompany shock may be grouped under the heads of anemic, almost bloodless body surface, lowered surface temperature, small pulse, feeble heart-action, and mental torpor. Of these phenomena, the anemia of the body surface, the lowered surface temperature, and the small pulse (all cardinal symptoms) do not tally with the assumption that the peripheral vessels are paralytic and dilated. Here, then, is the first failure of the supporters of the theory to correlate seemingly divergent facts. The theory assumes, moreover, that a most important portion of the nervous mechanism of the body is exhausted. Sup. Fig. 1. It has been definitely settled for us by physiologists, however, that the peripheral nervous mechanism most positively cannot be exhausted or even fatigued, and that in all probability the important centers of the central nervous mechanism are also indefatigable.

Here, then, is a second failure to correlate facts, and a second added weakness in the theory. Finally, the theory assumes that the vasomotor centers are poorly armed for defense, and that they therefore are the first to break ranks under the onslaught of traumata. This assumption is directly counter to a general law of biology, which teaches that the so-called fundamental functions, under which head vasomotor control is classified, were evolved countless ages of time prior to the accessory functions (skilled movements, special senses, etc.). Furthermore, the earlier evolved functions are but slightly affected by the impact of afferent impulses as contrasted with the accessory functions, which, lacking "the poise of countless generations, cannot so readily defend themselves against the afferent stream."² The theory, therefore, fails to correlate itself with a fundamental law of biology. Failure to substantiate clinical, physiological, and bi-

1. Fatigue. Frederic S. Lea. Harvey Lectures, 1905-1906, p. 69.

2. Vasomotor Relations. W. T. Porter. Harvey Lectures, 1906-1907, p. 98.

ological principles, to say the least, suggests some inherent weakness in the theory.

In a previous paper³ we attacked the widely spread doctrine that shock was due to exhaustion of the vasomotor centers and consequent paralysis of the peripheral vascular system. We rested our case on definite experimental data to prove that the peripheral vascular system was *not* paralyzed. The present paper is a continuation of the work already reported. Here, as in our previous work, we are forced to express our idea of shock in terms of blood-pressure, for the reason that no other factor in the symptom-complex permits of such constant and accurate measurement. And here, as also in our last paper, our object is to correct error rather than to frame a new theory. Our previous experiments were confirmed, and, in order to make results doubly certain, numerous details were added, such as the freezing and cocainization of nerves before division, and the curarizing of the animals.

A large part of our later experiments were based on the fact that stimulation of the central end of a cut vagus, when the other vagus is also divided, gives a remarkably constant pressor effect. Exposure of the nerve, chilling or drying of it, and the traumata resulting from the necessarily frequent stimulations, in no way interfered with an immediate and fairly constant rise of blood-pressure after every stimulation. Furthermore, stimulation of the central and of the vagus did not give rise to any paroxysms of pain, such as we encountered previously in stimulating the central end of various other afferent nerves in animals deeply anesthetized. These paroxysms of pain, when they occurred, markedly interfered with us, in our earlier work in that the violent respiratory re-

3. The Condition of the Peripheral Blood-vessels in Shock. M. G. Seelig and E. P. Lyon. Jour. of the A. M. A., January 2, 1909, p. 45.

flexes and muscular contractions set up by the pain rendered the correct interpretation of manometric tracings very difficult. The constant pressor result, following stimulation of the central end of the vagus, seems to be an exception to the phenomena worked out by Hunt,⁴ who showed that the stimulation of afferent nerves may result in a pressor or a depressor effect, according to varying conditions.*

At all events, this particular method of stimulating the central end of the vagus, afforded an excellent opportunity for studying the so-called percentile rise of blood-pressure. It is well known that stimulation of an afferent nerve, under suitable conditions, causes a rise of blood-pressure. With the circulatory mechanism in a constant state of equilibrium (if such a condition may be assumed, for argument's sake), a constant stimulus ought to be followed by a constant definite rise in pressure. If, on the other hand, the blood-pressure of the animal experimented upon is, for any reason, and with any degree of permanency reduced, the rise of pressure following stimulation of an afferent nerve could not be expected to reach the height attained during the stage of normal blood-pressure. Under such circumstances, stimulation will be followed by a rise of pressure, but the height of the crest of the rise from the abscissa line is less than that of the crest of the rise when the stimulus was applied during a stage of normal blood-pressure. In other words, the absolute rise in pressure, consequent upon stimulation, depends very largely upon the height of the blood-pressure at the time of the stimulation. If the pressure is high when the stimulation is made, the consequent rise will be sharp and marked; whereas, if the pressure is low at the time of stimulation, the

4. R. Hunt: *Journal of Physics*, 1895, p. 381.

*The constancy of the pressor response to stimulation of the central end of the cut vagus, when the other vagus is divided, is the subject of another research being carried on by us at the present time.

rise will be much less marked. The percentile rise, as understood by Porter (l. c.), and as used by us, refers to the relationship between the height of pressures before and after stimulation, rather than to the actual height of pressure. A diagramatic blood-pressure tracing, will serve better than words to illustrate the problem of absolute and percentile rises in pressure.

In Fig. A, F represents, let us say, a normal blood-pressure of 130 mm. of mercury. At B an afferent nerve is stimulated electrically, and immediately the blood-pressure rises to the height C G. As a result of shock the blood-pressure, later, falls until it is represented by the height D H, at which stage the afferent nerve is again stimulated, and the stimulation is followed by the rise to E I. The absolute height of pressure after the second stimulation (E I) is very much lower than the absolute height after the first stimulation (C G), but the relation that E I bears to D H is practically the same as the relation that C G bears to A F. In other words, *in proportion to the blood-pressure*, the rise after the second stimulation was the same as after the first stimulation. To this proportional rise, Porter has given the name *percentile*.

Our procedure consisted in anesthetizing dogs by Grehan's method (stomach anesthesia, with chloroform), connecting the carotid artery with a recording mercury manometer, and dividing both vagi (sometimes low and sometimes high in the neck). Repeated stimulations of the central end of one of the vagi with an induced current gave a fairly constant rise of blood-pressure. After the constancy of this rise was determined the animal's abdomen was opened, and by means of manipulation of the viscera and the introduction of ice into the peritoneal cavity, a state of shock was induced. As the blood-pressure fell the central end of the vagus was stimulated repeatedly,

and each stimulation brought forth a response that was not only as high as, but even higher percentilely than, was the first response elicited during the normal blood-pressure period. These stimulations were repeated up to the time when the pressure became threateningly low (20 mm.), and in every case stimulation was followed by a response, indicating not only an active vasomotor center, but a center that was struggling successfully against odds, and maintaining rises that were higher, percentilely, than those accomplished before the animal organism was compromised.

Thus far the results confirm those of Porter, the only difference between our methods lying in the fact that we strove to insure the greatest possible constancy of results by the selection of the vagus, rather than by taking one of the mixed sensory motor nerves.* But we were able, by the method of percentile rises, to demonstrate, not only that the vasomotor center was not exhausted in shock, but even that it maintained its tone to a remarkable degree. We found that for every dog used (dependent upon age, physical condition, or on some other unknown causes) there was a definite strength of current necessary to awaken a vasomotor response. This we determined by starting with a current too weak to call forth any response, and then shortening the distance between the primary and secondary coils until stimulation became effective. The first stimulation that succeeded in calling forth a pressor effect we called the *minimal* stimulation. A further increase in the strength of the current invariably caused a more pronounced pressor

*The use of the vagus also furnished us other valuable data not secured by Porter, in that we were able to note percentile rises with the blood-pressure as low as 20 mm., whereas the limit placed by Porter is from 30 to 65 mm. Porter, however, clearly anticipated results such as we secured; for in his Harvey lecture, he states his purpose to investigate the variations in pressor impulses elicited by stimulating the various afferent paths, "nerve by nerve."

effect, which we termed the *maximal* stimulation.** Here then we secured percentile variations in the rise of pressure dependent upon the tonicity of the vasomotor center, and we were able, by repeating these maximal and minimal stimulations, to show that even in the profoundest degree of shock, with the blood-pressure alarmingly low, varying strength in the stimuli called forth corresponding variant rises in pressure. It was, furthermore, interesting to note that the minimal stimulation necessary to call forth a pressor effect remained practically constant, both before and after the induction of profound shock, thus suggesting the fact that even in deep shock the tone of the vasomotor center was not depressed, as regards response to electrical stimulation.

The rise of pressure, which invariably followed stimulation of the central end of the vagus, must have been due to one or both of two factors: (1) an augmentation in the heart's action, or (2) a vasomotor constriction. Here is a problem full of interest, yet by no means easy of solution. The normal physiology of cardiac augmentation, acceleration, and inhibition is by no means definitely settled; and it is therefore hardly possible to draw dogmatic conclusions from our experiments along these lines. All of our previous work seemed to show conclusively that there was a distinct vasomotor constriction of the peripheral vascular system in shock; but we had, so far, not directed close attention to the heart. We based our heart-work on the assumption that augmentation of the heart is brought about through impulses delivered along the accelerator nerves. These accelerator fibres, passing as they do through the stellate ganglion, can

**These maximal and minimal electrical stimulation experiments, which are almost directly in line with similar ones carried out by Porter, were completed before we were in possession of Porter's results, and are therefore doubly valuable as independent confirmation. It seems, however, that Porter did not estimate the so-called threshold and maximal values during stages of very low blood-pressure.

be shunted out of action by removal of the stellate ganglia, a procedure accomplished with comparative ease by opening the dog's chest widely in the midline of the sternum (artificial respiration through tracheal canula), retracting the lung toward the middle line, locating the ganglion (just beneath the pleura, near the vertebral column, lying on the ventral surface of the 1st rib), and avulsing it. This procedure was carried out on the right and left sides, and then, after it was certain that both ganglia were extirpated, the central end of one of the cut vagi was stimulated. An immediate and pronounced pressor effect was the result, and continued to be present in the face of very low pressure. We secured this result in dogs varying widely as to age and general condition, and, furthermore, we secured the same result when we excised both celiac plexuses, in addition to the removal of the stellates. From this it would seem fair to assume that the pressor effects following stimulation of the central end of the vagus are due largely to vasomotor constriction and that cardiac augmentation, at least in the later stages of shock,* is not a primary factor in the rise.

In conclusion, it need hardly be emphasized that the results of our work point, in every instance, against the correctness of the theory that shock is a symptom-complex due to vasomotor exhaustion. ous details were added, such as the freezing and co-

DISCUSSION

DR. R. C. COFFEY (Portland, Ore.): I am afraid I shall do Dr. Crile an injustice by attempting to explain some of the work he is doing now along this line, which is even more deeply grounded than any work which he has given an account of before. He seems to have centered all of his work in the brain cells at the present time and is becoming more and

*The procedure for avulsing the stellate ganglion is certain to induce at least a fair degree of shock.

more convinced that the brain cell may be likened closely to an electric battery, whether it be from loss of blood, from shock or from long-continued disease. Shock is only a relative condition. You may have seen an account of the work of Dr. Crile in the *Journal of Medical Research* for April, in which he and Dolly have taken up the brain cells of animals under varying conditions. For instance, they will withdraw blood, and weaken the animal in other ways by starvation, and then they find that the brain cell of an animal that is normal will take a certain amount of a certain kind of stain. If you go a little further and find the animal is in not quite so good condition, the cells, taken from the cerebellum of a living dog, show a fainter color. If there is still further depression, he finds the color is still less and less, and so on as he goes on down. Severe hemorrhages from any cause or depletion by hunger, or any other condition, will lessen the normal force of the animal, so that Crile concludes that shock is a relative condition. He takes dogs in different states of shock, in different states of depletion, of one kind and another, and these gradually fail to take this stain. As we go on still farther we find the stain disappears, and the outline of the nucleus disappears and later it all disseminates or breaks up into little pieces. Finally, the particles of the blue stain show until the cell itself ruptures and degenerates, when the animal dies. The principal point is that Crile now considers shock as a more or less relative condition or term. While this has apparently but little to do with the treatment of shock, he seems to be getting down to an understanding of the real condition that exists.

If I have misinterpreted Dr. Crile's work I hope you will not hold him responsible for any mistake I have made.

DR. ARTHUR E. HERTZLER (Kansas City, Mo.): I am very glad Dr. Seelig has emphasized once more the fact that the position taken by the rank and file of the medical profession in regard to shock is wrong. There is a disposition on the part of the profession to accept a lot of things without verification by experimentation. Let us take the recent work of Crile, which Dr. Coffey has just mentioned. These dogs were etherized and stimulated. Ether has the power of dissolving that peculiar protoplasmic substance within the cells, of the nature of which we know little or nothing. Similar substances are found between endothelial cells. Ether has the power of dissolving that particular substance which we find in all the tissues. It will dissolve it between the endothelial

cells in the lungs under ordinary anesthesia, and if continued long enough it will dissolve the same substance in other cells. The more highly organized the cells are the greater the change. These experiments lose much of their force because you can get the same changes from ether without doing anything in the way of stimulation. On the other hand, by exhaustion without ether you get changes, not in the cell protoplasm, but in the Nissl bodies.

DR. COFFEY: Dr. Crile is using nitrous oxide gas and is producing the same condition.

DR. SEELIG (closing the discussion): The answer that Dr. Hertzler gave regarding ether was apropos. It is impossible to study the pathological changes anywhere in the body after the administration of ether without considering the effect of the ether. Ether causes a parenchymatous degeneration of all parenchymatous viscera. I know this to my own discomfort, because I have been trying to work out the pathology of shock on dogs. I have not used nitrous oxide gas in my experiments on account of the resulting cyanosis. A theory, before its proof is confirmed and before it is started rolling down the halls of fame and time, must be made to fit in with certain definite known facts. If there are clinical facts at hand that theory must dovetail with them. In shock, for example, the radial pulse is small. A satisfactory theory must account for this small pulse. It is an established physiologic law that the central nervous mechanism is indefatigable; that is, one cannot fatigue it by artificial means. The generally accepted theory, however, in the face of an established physiologic law, says that the vital centers can be fatigued, and we accept this theory, bait, hook, and all. I do not believe there is any warmer admirer of Dr. Crile than myself, and there is no man whom I esteem more highly than he. Whenever the opportunity permits me to go to Cleveland, I spend some time with Dr. Crile, but I do not agree with some of his views with reference to shock. If we are going to promulgate a theory of shock, that theory must fit in with known fundamental laws. If it does not, the theory may be right and the fundamental law misconceived; or the fundamental law will stand as proved, and the theory is wrong, thus necessitating the reconstruction of a new theory.

Regarding the changes that Crile and Dolly have found in the brain cells: I wish to say to Dr. Coffey that another investigator studying the effect of hemorrhage on the brain cells, found that almost identically the same pictures

were produced by hemorrhage as by shock. If one promulgates a theory, he must promulgate it with certain definite limitations, which open the way for others to either confirm or repudiate it. Dogmatic assertion has a most specifically limited place in the pure science of medicine.

CLINICAL NOTES ON A CASE OF CUT THROAT

GILBERT GEOFFREY COTTAM, M. D.

ROCK RAPIDS, IOWA

P. M. B., male, aged 23, worker in a steam laundry, attempted to commit suicide on August 17, 1909, by cutting his throat with a razor. He did not draw the blade tangentially across the throat in the usual manner, but grasped the razor in his fist at the juncture of the blade and the handle. Digging the point into his neck at the inner border of the left sternomastoid, just above the upper edge of the thyroid cartilages of the larynx, then cutting backwards, slightly upwards, and to the right as far as the inner edge of the right sternomastoid, he divided the pharynx completely, severing also the prevertebral muscles and exposing the vertebral column, but missing the great vessels of the neck on both sides. The hemorrhage, nevertheless, was profuse, but was controlled by the application of numerous clamps. Asphyxia was prevented by clamping a hemostat on the base of the epiglottis, which had been divided, and keeping it drawn forward.

On his being brought to the hospital, it was found that he was so weak from shock and loss of blood that the repair of the severed structures could be undertaken without anesthesia. While this was in progress a quart of normal saline fluid was injected into the subcutaneous cellular tissues of the thighs and chest, with marked good effect upon the pulse and general condition.

A preliminary tracheotomy was made, then the suturing of the pharynx done with Pagenstecher linen,

the first row of stitches only including the posterior muscular layers, after which the mucous coat was stitched throughout its entire circumference. the epiglottis anchored back to its place and, finally a row of stitches placed in the lateral and anterior muscular layers. The depressors of the hyoid were then united with catgut, and the skin edges approximated with silk, provision being made at each extremity of the incision for cigarette-drainage down to the suture-line of the pharynx.

Recovery occurred without notable incident. Rectal feeding was used for ten days, then per os through a stomach-tube until the patient could swallow. He went home on the fourteenth day, able to swallow liquids and soft food. The trachea-tube had been removed a few days previously.

In the course of another two weeks there began to be difficulty of swallowing and breathing. Both increased until it became necessary to repeat the tracheotomy and again resort to rectal alimentation. An annular stricture of the pharynx was found to be forming, and this continued in spite of all efforts to overcome it. It was remarkably resistant to dilatation. I succeeded in introducing the blades of a heavy Goodell uterine dilator, but could only make a very slight impression upon it, enlarging the opening to the extent of admitting of a No. 21 French bougie. This opening, situated just back of the epiglottis and therefore more over the larynx than the esophagus, will not permit the passage of an ordinary straight or soft tube to the esophagus for feeding purposes. Such a tube goes down into the larynx every time. After much experimenting I found that the only tube available for the purpose was a Mercier coudé prostatic catheter. The beak of this, introduced backwards, clears the posterior wall of the larynx and enters the esophagus. By this means the patient is able to feed himself and has gained in weight steadily since the

method was adopted. I have been experimenting of late with a curved silver deglutition-tube, which I have had made to extend from the stricture to the esophagus and fitted with a shoulder to rest on top of the stricture and to be worn constantly. This works fairly well with a small volume of fluid, but with larger amounts portions of the liquid seem to be forced around the tube and reach the larynx. I have not yet been able to dispense with the trachea-tube, for, when the patient is feeding himself with the prostatic catheter, the opening in the pharynx is completely occupied, and there is no avenue for respiration except by the tracheotomy opening.

I have thought this case worthy of record because of several unusual features connected with it: first, the remarkable depth of the wound, which completely severed the pharynx and the prevertebral tissues, exposing the bone; second, the patient's escaping death from hemorrhage; asphyxia, pneumonia or sepsis; third, the occurrence of an annular stricture of the pharynx in so peculiar a situation as to interfere with the action of the epiglottis and obstruct the larynx and trachea; and, fourth, the problems of meeting all these situations. Instances of this character must be quite uncommon, as a fairly thorough search of the literature reveals very little reference to anything very similar.

In a sense this may be considered merely a preliminary report, as I hope to be in a position to state, at some subsequent date, that I have been able to accomplish something that will enable this patient to dispense with his tracheotomy-tube and be able to swallow his food. Whether this will take the form of some mechanical device or a plastic operation, such as was once used by B. Farquhar Curtis (*Annals of Surgery*, Vol. XXXIII, p. 152) in a case of syphilitic stricture in nearly the same region, remains yet to be decided.

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